

# NORTH CAROLINA STRIPED BASS MONITORING

## Completion Report, Grant F-56, Segments 14 – 18



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## ABSTRACT

Project F-56 updates and complements the historical long-term Albemarle/Roanoke (A/R) juvenile striped bass, *Morone saxatilis*, survey, as well as fishery dependent, fishery independent and tagging surveys of adult striped bass in the A/R and Atlantic Migratory stocks. Phase II stocking and tagging occurred in three coastal North Carolina river systems from 2006 through 2010. Juvenile sampling for 2011 resulted in a juvenile abundance index of 15.1, well above the long-term average of 8.5. The 5-year average JAI was 7.6. Three of the five years had an average JAI, one year was nearly twice the average, and only one year exhibited what is considered a spawning failure. The independent gill net survey monitored the length, weight, sex, age, and relative abundance of striped bass during the fall/winter (F/W) and spring seasons. The catch-per-unit-effort was 0.53 for the 2010/2011 F/W survey and 1.17 for the 2011 spring survey (long-term average of 0.55 and 0.83). Fish representing each year class from 2000 to 2009 were captured. Both surveys combined tagged 1,273 striped bass. The 5-year average CPUE for the F/W and spring surveys was 0.50 and 0.97. The Albemarle Sound Management Area (ASMA) commercial and recreational harvest was sampled for length, weight, sex, and age composition. The 2010 fall ASMA commercial fisheries harvested 5,816 fish that weighed 23,181 lbs. During 2006 – 2010 the total fall commercial harvest was 28,592 fish that weighed 138,231 lbs. The 1992 – 2007 year classes were represented in the harvest. The 2011 spring ASMA commercial fisheries harvested 21,350 fish that weighed 111,241 lbs. During 2007 – 2011 the spring commercial fisheries harvested 112,718 fish that weighed 549,841 lbs. The 1993 – 2008 year classes were represented in the harvest. The 2010 fall ASMA recreational fishery harvested 1,624 fish that weighed 5,393 lbs. For 2006 – 2010 the fall recreational fishery harvested 21,664 fish that weighed 71,155 lbs. The 1997 – 2007 year classes were present in the harvest. The spring 2011 recreational fishery harvested 5,845 fish that weighed 19,458 lbs. From 2007 to 2011 the spring recreational fishery harvested 23,685 fish that weighed 71,155 lbs. The 2010/2011 Atlantic Ocean commercial fisheries harvested 10,701 fish that weighed 242,600 lbs. During the 2006/2007 – 2010/2011 Atlantic Ocean commercial seasons 63,433 fish that weighed 1,428,898 lbs. The 1991 – 2005 year classes were represented in the harvest. Approximately 420,081 Phase II striped bass were stocked into the Tar/Pamlico, Neuse, and Cape Fear rivers in December 2010 of which 9,000 were tagged (3,000 each system). Approximately 1,285,923 Phase II striped bass were stocked between the Tar/Pamlico, Neuse, and Cape Fear rivers from 2006 to 2010.

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## INTRODUCTION

Striped bass have long been exploited in the Albemarle Sound/Roanoke River (A/R) system (ASMFC 1987, 1990, Street and Johnson 1977). In the early 1970s alterations in Roanoke River flow regimes and changes in watershed use by urban and industrial encroachment diminished striped bass habitat quality (Fish 1960, Rulifson and Manooch 1990, 1991). These impacts coupled with excessive fishing mortality resulted in repeated years of spawning failure and a depressed striped bass population from the mid-1970s through the late-1980s. During the mid-1980s strict harvest regulations were put in place and negotiations about ideal water flow were undertaken through the Roanoke River Flow Committee. These actions resulted in renewed spawning success that started in 1993. In 1997 the Atlantic States Marine Fisheries Commission (ASMFC) declared the A/R striped bass stock recovered.

There are two striped bass geographic management units in North Carolina. The northern management unit is comprised of two harvest management areas; the Albemarle Sound Management Area (ASMA) and the Roanoke River Management Area (RRMA). The ASMA includes the Albemarle Sound and all its joint and inland water tributaries, (except for the Roanoke, Middle, Eastmost and Cashie rivers), Currituck, Roanoke and Croatan sounds and all their joint and inland water tributaries, including Oregon Inlet, north of a line from Roanoke Marshes Point across to the north point of Eagle Nest Bay in Dare county. The RRMA includes the Roanoke River and its joint and inland water tributaries, including Middle, Eastmost and Cashie rivers, up to the Roanoke Rapids Dam. The striped bass stock in these two harvest management areas is referred to as the Albemarle Sound/Roanoke River (A/R) stock, and its spawning grounds are located in the Roanoke River in the vicinity of Weldon, NC. Management of recreational and commercial striped bass regulations within the ASMA is the responsibility of the North Carolina Marine Fisheries Commission (NCMFC). Within the RRMA commercial regulations are the responsibility of the NCMFC while recreational regulations are the responsibility of the North Carolina Wildlife Resources Commission (NCWRC). The A/R stock is also included in the management unit of the Atlantic States Marine Fisheries Commission (ASMFC) Amendment #6 to the Interstate Fishery Management plan (FMP) for Atlantic Striped Bass.

The southern geographic management unit is the Central Southern Management Area (CSMA) and includes all internal Coastal, joint and contiguous inland waters of North Carolina south of the ASMA to the South Carolina state line. There are spawning stocks in each of the major river systems within the CSMA; the Tar/Pamlico, the Neuse, and the Cape Fear. These stocks are collectively referred to as the CSMA stocks. Spawning grounds are not clearly defined in these systems as access to spawning areas may be influenced by river flows as well as impediments to migration. Management of striped bass within the CSMA is the responsibility of the NCMFC and the NCWRC, and is not subject to compliance with the ASMFC Interstate FMP for Atlantic Striped Bass.

In North Carolina internal coastal waters, striped bass are also collectively managed under the NC Estuarine Striped Bass FMP (2004).

Harvest regulations were imposed to rebuild striped bass populations and subsequently to maintain a sustainable harvest by regulating fishing mortality rates in both the recreational and commercial fisheries for striped bass in North Carolina. Much of the information supporting the existing management strategies came from a number of individual studies, many of which were supported with Sport Fish Restoration funds (Henry, Hardy, and Taylor 1991, 1992; Henry,



Taylor, and Winslow 1992; Henry 1993; Taylor and Hardy 1993, 1994; Winslow and Henry 1995; Trowell and Winslow 1995, 1996, 1997, 1998; Dilday and Winslow 1999, 2000, 2002a, 2002b, 2003; Winslow 2005, Godwin and Winslow 2005, 2006; Godwin 2007, 2008, 2009, 2010).

Information will be used to establish and evaluate rules and regulations that are implemented to manage striped bass fisheries. Striped bass are one of the most recreationally sought species in North Carolina. Healthy striped bass stocks in the Albemarle Sound and Central Southern Management Areas will benefit anglers in the form of increased fishing opportunities and greater fishing trip satisfaction. These angler benefits will positively impact local economies in the form of increased expenditures for bait, tackle, fuel, lodging, and food.

The objectives of this project are to monitor the status of striped bass in the Albemarle South/Roanoke River and the Atlantic Migratory stock to assess the effectiveness of management measures and to sustain the depressed populations of striped bass in Central/Southern North Carolina systems by stocking to help the recovery of these stocks. The research conducted in this project, as in previous projects, will provide essential data for incorporation into statistical catch at age stock assessment analysis. Fisheries independent research includes: 1) juvenile striped bass surveys with seines and trawls; 2) a stratified-random multiple-mesh gill net survey; 3) striped bass tagging; 4) and juvenile striped bass stocking in various river systems. Fishery dependent research includes: 1) monitoring of the ASMA commercial harvest; 2) monitoring of the ASMA recreational harvest; and 3) monitoring of the Atlantic Ocean commercial harvest.

The continuation of these long-term monitoring projects will allow the NCDMF and NCWRC to monitor changes in mortality rates and age composition of the stock, and aid in determining whether management measures are appropriate. These various monitoring projects will be updated annually. Possible management actions include area or seasonal closures, restrictions to fishing means and methods, minimum size limits, and daily catch limits.

## **JOB 1: JUVENILE ABUNDANCE SURVEYS**

### **METHODS**

Juvenile abundance surveys were conducted from June through mid-October and used beach seine and trawl gears. For each gear a sample is one tow or pull of the seine at a station. Beach seine sampling was conducted weekly from the first week in June to the second week of July, at nine fixed stations in western Albemarle Sound for a target of 54 samples (Figure 1). A 60 ft long by 6 ft tall bag seine, with a 6 ft by 6 ft by 6 ft bag constructed of 0.25 inch stretch mesh (ISM) in the body and 0.125 ISM in the bag was used.

Trawl sampling was conducted bi-weekly from July to mid-October at seven established stations in the western Albemarle Sound (Hassler trawls) and 12 established stations in the central Albemarle Sound for a sampling target of 56 and 84 samples respectively (Figure 1). Sampling gear was a semi-balloon trawl with an 18 ft head rope, constructed of 1½ ISM webbing in the body and ½ ISM webbing in the cod end. Tow times were 15 minutes in the western sound trawls and 10 minutes in the central sound trawls.

Striped bass collected were counted and measured to the nearest millimeter for fork length (FL) and total length (TL). A maximum of 30 fish were measured per station. All other species were enumerated and measured for FL and/or TL. Depending on the species, either a range was taken, or a maximum of 30 fish were measured for FL or TL at each station. Surface and bottom water temperature (°C), dissolved oxygen (mg/L), and salinity (ppt) were collected using a Yellow Springs Instruments (YSI) 85 meter. Submerged aquatic vegetation (SAV) was identified to species and/or genus.

Catch per unit effort (CPUE) from the beach seines and trawls was calculated as the arithmetic mean of the samples. Results from the western Albemarle Sound trawl survey have been used as the A/R striped bass stock juvenile abundance index (JAI) since 1955, and are a good indicator of year class strength and future harvest potential.

All data were coded on NCDMF biological datasheets and entered into the NCDMF Biological Database.

## **RESULTS AND DISCUSSION**

### **2011**

#### Western Albemarle Sound Beach Seine Survey – 2011

Sampling efforts collected 570 young-of-year (YOY) striped bass in 54 samples for a CPUE of 10.6, slightly above the long-term average of 9.8 (Table 1). Striped bass YOY were collected during each week of the beach seine survey and there were nine tows with zero catch. Total length ranged from 22 to 75 mm and mean TL increased an average of 5.8 mm per week, from 31 mm on 7 June to 60 mm on 11 July (Table 2).

#### Western Albemarle Sound Trawl Survey and Juvenile Abundance Index – 2011

Sampling efforts collected 845 YOY striped bass in 56 samples, for a JAI of 15.1, nearly double the long-term average of 8.5 (Table 1, Figure 2). Striped bass YOY were collected during each week and there were three tows with zero catch. Total length ranged from 41 to 130 mm and mean TL increased an average of 3.0 mm per week, from 58 mm on 13 July to 101 mm on 18 October (Table 3).

Normally in the western sound trawl survey, the majority of the total year's catch occurs during the first two or three sampling weeks, then catches decline each week thereafter. This sampling season started off the same way, when catches peaked during week two then gradually declined through weeks four and five. On August 28 hurricane Irene made landfall in eastern NC on with the eye travelling through eastern Albemarle Sound. Heavy rains affected the entire Albemarle Sound watershed and tributaries were overflowing their banks. This lead to very poor water quality and massive fish kills in the upper reaches of most tributaries to Albemarle Sound. In the Roanoke River however, even down at the mouth of the river near Plymouth, dissolved oxygen (D.O.) levels were near zero until the middle of September. The lower reaches of the Roanoke are a nursery area for YOY striped bass, but there are no sampling stations in the Roanoke proper (Figure 1). During sampling week 36 that occurred immediately after the hurricane, staff collected 221 YOY striped bass, the largest collection for a single sampling week during the entire season. It's possible that low D.O. forced the YOY out of the lower Roanoke and into the western sound trawl stations, inflating the JAI. We will gain a more

accurate measure of the true year class strength once the 2011 year class is large enough to recruit to the gill net survey as one and two year olds.

#### Central Albemarle Sound Trawl Survey – 2011

Sampling efforts collected 125 YOY striped bass in 84 trawls for a CPUE of 1.5, below the long-term average of 4.8 (Table 1). Juveniles were consistently collected at only one or two stations, and 80% of the tows had zero catch. Total length ranged from 64 to 146 mm and the mean TL increased an average of 3.1 mm per week, from 75 mm on 20 July to 113 mm on 12 October (Table 4).

#### **2007 - 2011**

##### Juvenile Abundance Surveys – 2007-2011

Juvenile abundance surveys in the Albemarle Sound, NC, during 2007 – 2011 sampling period collected 3,878 YOY striped bass (Table 5), compared to 4,843 collected in 2002 – 2006 and 10,759 collected in 1997 – 2001.

The western sound trawls have been used as the JAI for the A/R striped bass stock since 1955. During the 2007 – 2011 sampling period, 2,140 striped bass were collected (5-year CPUE = 7.6) compared to 2,592 during the 2002 – 2006 sampling period (5-year CPUE = 9.3). However, the higher overall CPUE for the 2002 – 2006 period is due to a very large JAI in 2005. For the 2002 – 2006 period there were two years (2003 and 2004) in which the JAI was below or near the level that is considered spawning failure (JAI = 1.5, which corresponds to the 1<sup>st</sup> quartile of the years 1955 - 2009), while in the 2007 – 2011 period there was only one year that was below the spawning failure definition. Examining each individual sample for the periods, out of a 5-year total of 280 tows, there were 132 tows with no catch for 2002 – 2006 compared to 112 tows with no catch for 2007 – 2011.

An examination of the entire time series of the western sound trawls reveals much annual variability in spawning success. From 1955 to 1977 the JAI average was 7.9, with normal annual variability due to environmental conditions. Then there is the period from 1978 to 1992 in which the stock had essentially crashed. During that time, the JAI was below the defined spawning failure threshold for 11 out of 15 years, due to poor water quality and altered flow regimes in the Roanoke River, coupled with years of excessive fishing mortality. After strict regulations to reduce harvest and agreements with numerous entities to improve water quality and provide suitable flows in the Roanoke River, from 1993 to 2000 the stock experienced unprecedented spawning success. Those eight years had the four highest JAIs in the time series up to that point, with only one year of spawning failure. The JAI average from 1993 to 2000 was 24.5. The reasons for such unprecedented spawning successes during this time are unknown, but environmental reasons likely are a significant factor. Fishing mortality on the stock had also been reduced significantly which certainly lead to increased stock abundance also contributing to the renewed spawning success. The stock was declared recovered in 1997. For 2001 to 2011, the JAI average was 8.0, slightly below the long-term JAI average of 8.5 (Figure 2).

## **JOB 2: STRIPED BASS INDEPENDENT GILL NET SURVEY**

### **METHODS**

The stratified-random multiple-mesh Independent Gill Net Survey (IGNS) began in 1990 to monitor the striped bass resident and overwintering fall/winter population in the Albemarle and Croatan Sounds and the A/R striped bass spring spawning population. The 12 different mesh sizes used allow capture of fish age one and older.

Sampling for the IGNS was conducted from November to late May of each year. Sampling gear was monofilament gill nets 9 ft or 10 ft deep, hung in 40-yard sections, with a hanging coefficient of 0.50. Mesh sizes ranged from 2 ½ inch stretch mesh (ISM) to 7 ISM at ½ inch intervals, 8, and 10 ISM, for a total of 12 mesh sizes. Twine sizes varied as follows: 2 ½ to 4 ½ ISM had a twine size of 0.33 mm (#104), 5 to 7 ISM had a twine size of 0.40 mm (#139), and 8 and 10 ISM had a twine size of 0.57 mm (#277). Heavier twine size in the larger mesh nets was intended to improve retention of larger fish. Gill nets were hung as one of two types: floating or sinking. Float nets were hung using ½ inch float line and 20 lb lead line so as to fish from the surface of the water column down to the depth of the net, while the sink nets were hung using 3/8 inch float line and 40 lb lead line so as to fish from the bottom of the water column to the height of the net. Six nets were tied together to form a “gang”. Gangs of nets were one of four types: 1) large mesh floating net; 2) large mesh sinking net; 3) small mesh floating net; or 4) small mesh sinking net. Gangs were tied together in such a way as to minimize mesh size selectivity (i.e. small mesh net order = 2 ½, 3 ½, 4 ½, 3, 4, 5, and large mesh net order = 6 ½, 5 ½, 7, 6, 8, 10). Float nets were set with a navigational fairway between the third and fourth net in each line. Each crew fished one “set” of nets, which was made up of four “gangs”: One gang each of small mesh float nets, small mesh sink nets, large mesh float nets, and large mesh sink nets. Therefore, there were 24, 40-yard gill net sections equaling 960 yards of gill net fished by each crew per sampling day.

Six sample zones in the Albemarle and Croatan sounds were divided into one-mile square quadrants with an average of 22 quadrants per zone (Figure 3). Areas unsuitable for gill net sampling, such as marked navigational channels and areas with excessive submerged obstructions were excluded. Quadrants within each zone were randomly selected. Alternate quadrants within each zone were randomly selected in case the primary quadrant could not be sampled due to adverse weather conditions or space limitations. In Zones II – VI, gangs of nets were set perpendicular to the shore. In Zone VII, gangs were set parallel to the shore due to the substantial current associated with local tides. Some quadrants may contain only shallow water, while others may contain only deep water. In quadrants that contained both shallow and deep water areas, float and sink nets were set in both shallow and deep areas to assure a more complete assessment of how striped bass use different habitats and portions of the water column by season. Nets fished in the shallow areas (less than 10 ft deep) were termed as “FIN” (float inshore) and sampled the majority of the water column. Nets fished in water deeper than 10 ft were identified as: 1) “FO” (float net offshore) with the net fishing from the surface of the water column to the depth of the net, or, 2) “SO” (sink net offshore) with the net fishing from bottom of the water column to the height of the net. Gangs of nets were separated to the greatest extent possible within each quadrant to eliminate interference caused by one gang fishing too close to another, as well as to sample various habitat types and depths that may exist in the same quadrant.

The fishing year was divided into two segments: 1) Fall/Winter (F/W) segment, November to February; and 2) spring segment, March through May. The sampling methods remained the same during each sampling segment. However, areas fished, sampling frequency, and sampling effort were altered seasonally.

During the F/W segment, two survey crews each fished one set of nets each sampling day. Each crew sampled each of the six zones once monthly, providing 24 fishing days per month (12 per crew) and a total of 96 fishing days for the F/W season. A fishing day was defined as one crew, fishing the full set of nets, after a 24 hour soak time. Total gear soak time for each quadrant was 48 hours. Each 40-yard net, fished for 24 hours, was one unit of effort. Monthly effort for all mesh sizes was equal, except when nets were damaged or hampered by debris or rough weather. Therefore, the maximum amount of units of effort for the F/W segment was 2,304.

During the Spring segment, gill net effort was concentrated in western Albemarle Sound (Zone II), near the mouth of the Roanoke River. The shift to Zone II was designed to increase the chance of intercepting A/R striped bass moving through this area during their migration to the Roanoke River spawning grounds. Effort was concentrated in Zone II to determine differences in the size, age, and sex composition of the spring spawning migration relative to the F/W resident and overwintering population. Zone II was further sub-divided into southern and northern areas (Figure 4). The southern area, adjacent to the Roanoke River, received effort at a 2:1 ratio south to north, based on the historical seasonal abundance of mature striped bass (Harriss et al. 1985). Quadrants sampled were randomly selected as previously noted. In order to effectively sample the entire spring segment, minimize lapses in effort, and eliminate simultaneous sampling, fishing effort was conducted continuously, seven days a week, with two fishing days per quadrant, from March 1 until the end of May. Only one set of nets was fished instead of two, for a maximum daily effort of 24, and a maximum effort for the entire Spring segment of 2,208 units.

Striped bass collected during both survey periods were counted and measured to the nearest mm for FL and TL. Scales were removed from all striped bass unless adverse weather during tagging efforts hampered a crew's ability to take them. Scales were removed from the left side of the fish, above the lateral line and between the end of the first dorsal fin and the beginning of the second dorsal fin. Sex, gut content, scales, weight (kg) data, and a visual inspection of internal organs for signs of mycobacteriosis infection were taken from striped bass that did not survive entanglement in the sampling gear. Sex was determined by visual inspection in the lab or when possible in the field, by applying abdominal pressure and observing the presence of milt or eggs.

Healthy striped bass were marked with an internal anchor tag. Tags were manufactured by Floy (FM-84) with a tube length of 90mm and anchor disc dimensions of 5mm x 15mm. Tags were inserted in the abdominal cavity on the left side posterior to the pectoral fin. Fish were released immediately upon tagging. A letter stating the release date, location, days at large, estimated distance traveled, and length at release was sent to each person returning a tag. A reward was offered of a choice of \$5 or a North Carolina Striped Bass Tagging Program cap per tag. All tag returns were entered into a random drawing at year's end for three \$100 rewards. Tagging activity was publicized in the media, through presentations to various organizations, and by distributing posters at marinas, ramps, tackle stores, and fish houses.

A maximum of 15 scale samples per sex per 25 mm TL size group, per F/W and Spring segments, was analyzed for age estimates (Ketchen 1950). Age proportions within each sex

and size group were calculated and expanded to the remaining sample by use of an age length key. Weight and length at age were reported for only those individuals that were aged. To prepare scales for ageing, scale impressions were made on acetate sheets with a Carver<sup>®</sup> heated hydraulic laboratory press and annuli counted by examination at 24x and 33x magnification on a microfiche reader. Annuli were counted as described by Harriss et al. (1985). Age and year class were assigned according to conventions developed by the ASMFC's Striped Bass Scientific and Statistical Committee. In North Carolina, the time of annulus formation was designated to be January 1. Age and year class were assigned in consideration of the date of capture relative to the January birth date. In general, individuals captured between 1 November and 31 December, were aged by counting each annuli as a year, with the distance between the last annuli and the scale edge as plus growth. Individuals captured between 1 January and 31 May, were aged by counting each annuli as a year, then adding one year for the scale edge, thus assigning all animals to their proper year class. Actual annulus formation of striped bass in NC is sometime between March and June, so there are some additional protocols to ensure accurate year class designation. For a more detailed explanation of North Carolina estuarine striped bass scale preparation and ageing protocol see the cooperative scale ageing document developed by NCWRC and NCDMF staff (NCWRC, NCDMF 2011). Other species collected during the F/W and Spring segments were counted and sub-sampled for FL and/or TL. Some species were further sampled for weight, sex, maturity, and various ageing structures. Date, weather elements, water depth (m), water temperature (°C), dissolved oxygen (mg/L), salinity (ppt), and effort parameters were recorded for each mesh/site combination. All data were coded on NCDMF biological datasheets and entered into the NCDMF Biological Database.

## **RESULTS AND DISCUSSION**

### **2010 - 2011**

#### Fall/Winter Independent Gill Net Survey - 2010/2011

The striped bass resident and overwintering F/W population in Albemarle and Croatan sounds was monitored. The size, sex, and relative abundance of year classes were determined for the season.

A total of 1,200 striped bass was collected in 2,276 units of effort, for a CPUE of 0.53, below the long-term average of 0.55 (Table 6; Figure 5). Total length was not recorded for nine individuals that were excluded from age analysis.

Ages were assigned for 279 individuals. The 2000 and 2002 – 2010 year classes were represented in the sample. The 2008 year class comprised 56.1% of the sample, followed by the 2009 (9.2%), 2005 (9.1%), 2007 (13.9%), 2006 (7.6%), and 2004 (2.9%) year classes. The 2010, 2003, 2002, and 2000 year classes combined to equal less than 2.0% of the sample (Table 7). There were 222 males, 215 females, and 755 of unknown sex in the sample (sex was not assessed on eight individuals).

The length frequencies ranged through the 250 to 750 mm TL bins (250 mm bin = 250-274) and were bimodal. The first mode was formed through the 325-375 mm bins and contained 18% of the sample. The second mode was formed through the 400-525 mm bins and contained 75% of the sample (Figure 6).

### Spring Independent Gill Net Survey – 2011

The striped bass spawning stock for the A/R population was monitored. The size, sex, and relative abundance of year classes were determined for the season.

A total of 1,721 striped bass was collected in 1,447 units of effort, for a CPUE of 1.19, the second largest CPUE in the 21 year survey (Table 6). Total length was not recorded on six individuals that were excluded from age analysis.

Ages were assigned for 329 individuals. The 2000 and 2003 – 2010 year classes were represented in the sample. The 2008 year class comprised 47.7% of the sample, followed by the 2009 (30.2%), 2007 (8.2%), 2006 (5.0%), and 2005 (3.3%) year classes. The 2010, 2004, 2003, and 2000 year classes combined to equal 2.0% of the sample (Table 8). There were 633 males, 683 females, and 404 of unknown sex in the sample (sex was not assessed on one individual). As usual, the sex ratio shifted from a higher proportion of males sampled in March and April to a higher proportion of females sampled in May. The male:female ratios for March, April, and May were 1.0:0.9, 1.0:0.9, and 1.0:2.5 respectively.

The length frequencies ranged through the 200-925 mm TL bins and were bimodal. One mode was formed through the 325-375 mm TL bins which comprised 26% of the sample, while a second mode was formed through the 400-525 mm TL bins which totaled 68% of the sample (Figure 7).

### Striped Bass Tagging – Fall/Winter Independent Gill Net Survey 2010/2011

During the F/W IGNS, 748 striped bass were tagged and released in the ASMA (Figure 3).

### Striped Bass Tagging – Spring Independent Gill Net Survey 2011

During the spring IGNS, 525 striped bass were tagged and released in the ASMA (Figure 4).

## **2006 - 2011**

### Fall/Winter Independent Gill Net Survey – 2006/2007-2010/2011

Sampling during the 2006/2007 – 2010/2011 F/W surveys resulted in the collection of 5,656 striped bass for a 5-year CPUE of 0.50, slightly below the long term average of 0.55. This 5-year period contained the smallest (2006/2007) as well as the fourth largest (2007/2008) CPUE values observed in the survey time series. The small 2006/2007 value was likely due to back to back spawning failures in 2003 and 2004, as the majority of fish sampled in the gill net surveys are consistently ages 2-4. Likewise, the 2005 JAI value was one of the highest in the JAI time series and was the dominant year class in the 2007/2008 gill net survey. The 2008/2009 – 2010/2011 surveys were all slightly below the long term average, although the CPUE increased slightly each year (Table 6, Figure 5).

The strong 2005 year class is evident in the overall catch and percent composition of the catch in the surveys. Although the 2008 year class JAI was only average, the year class abundance appears to be greater than average (Table 9).

The largest fish collected was in the 900 mm bin. The majority of fish however are consistently in the 300-525 mm bins. The movement of year classes through the survey is evident in the

time series of graphs, as illustrated in the strong 2005 year class that dominated the 2007/2008 and 2008/2009 surveys (Figure 6).

#### Spring Independent Gill Net Survey – 2007-2011

Sampling during the 2007 – 2011 spring surveys resulted in the collection of 7,730 striped bass for a 5-year CPUE of 0.97, higher than the long term average of 0.83. Similar to the F/W surveys, the strong 2005 year class produced the largest CPUE value in the time series in 2008, and one of the lowest values was in 2007 due to the poor 2003 and 2004 year classes. The spring CPUE trend has increased the past three years from below average in 2009 to above average in 2011 (Table 6, Figure 5).

Due to being understaffed we were not able to sample the full seven days a week as called for in the sample design during the spring 2010 survey. Sampling was conducted six days a week throughout the season with available staff. As a result, total samples collected (n=1,362) were below the target that would have occurred if the maximum number of samples were completed (n=2,208). In prior years, an average of 1,930 samples were collected with lost samples typically caused by inclement weather, damage to nets from boats, and nets fishing improperly due to floating grass or debris. Although sample size was lower in 2010, samples were collected throughout the season and the catch rates should be reflective of striped bass abundance in the sample area during this period.

The year class abundance trends in the spring survey are very similar to the F/W survey, exhibiting the strong 2005 and 2008 year classes and the poor 2003 and 2004 year classes. When compared to the F/W surveys the spring survey typically has more year classes represented, which would be expected as the survey is designed to sample the spawning stock and encounters larger males and females on the way to the spawning grounds that are not typically residents in the Albemarle Sound during fall and winter months. The oldest fish collected was from the 1993 year class, the first in a series of extraordinarily successful spawning seasons after the stock had collapsed in 1978 (Table 10, Figure 5).

The largest fish sampled was in the 1,150 mm bin during 2008, and was from the 1993 year class. Like the F/W survey, the majority of fish collected are still between the 300 and 525 mm bins and the overall length frequencies are similar (Figure 7).

#### Striped Bass Tagging – Fall/Winter Independent Gill Net Survey 2006/2007-2010/2011

During this F/W 5-year period 2,991 striped bass were tagged and released throughout the Albemarle and Croatan sounds.

#### Striped Bass Tagging – Spring Independent Gill Net Survey 2007-2011

During the spring 5-year period 2,197 striped bass were tagged and released in the western Albemarle Sound. Although the spring period consistently caught more fish than the F/W, higher at-net mortality rates due to warmer water temperatures resulted in fewer fish being tagged and released during the spring survey.



## **JOB 3: STRIPED BASS CATCH COMPOSITION SURVEY**

### **METHODS**

#### Albemarle Sound Management Area Commercial Fishery

The annual commercial total allowable catch (TAC) in the Albemarle Sound Management Area (ASMA) was split to allow a fall (October – December) and spring (January – April) harvest. The ASMFC Striped Bass Management Board declared the A/R striped bass stock recovered in October 1997. This allowed a 10% TAC increase in 1999 to 275,968 lb, split evenly between the recreational and commercial user groups (137,984 lb each). In 2000, the total ASMA TAC was increased by 61%, resulting in a 450,000 lb TAC. The annual TAC increased again in 2003 to 550,000 lb, and has remained at this level through 2011.

Albemarle Sound commercial fish house operations were sampled on a weekly basis during the commercial seasons. Sampling targets were 300 fish for the fall season and 600 fish for the spring season. Fish were measured to the nearest mm for FL and TL, and weighed to the nearest 0.01 kg. Sex was determined by the Sykes (1958) method. Scale samples were removed, processed, and aged as described in Job 2. Once the sub-sample was aged, numbers of fish per year class for the total commercial harvest were assigned using the following formula:

$$YC_N = L_T \times WTYC_{S\%} / WTYC_{SAVG}$$

where  $YC_N$  was the number of individuals per year class,  $L_T$  was total landings,  $WTYC_{S\%}$  was the sub-sample percent weight per sex, per year class, and  $WTYC_{SAVG}$  was the sub-sample average weight per individual, per sex, per year class.

All data was coded on NCDMF biological datasheets and entered into the NCDMF Biological Database.

#### Albemarle Sound Management Area Recreational Fishery

The NCDMF has conducted annual creel surveys (fall and spring seasons) for striped bass in the ASMA since 1991. In the fall of 2005 the NCDMF changed the design of its ASMA striped bass creel survey to more accurately reflect fishing pressure estimates and harvest estimates. This new design was also the same design as used by NCDMF personnel for striped bass creel surveys in the Central Southern Management Area (CSMA), and NC Wildlife Resources Commission (WRC) personnel for striped bass creel surveys in the Roanoke River Management Area (RRMA), allowing for a more statistically valid comparison of striped bass effort and harvest data between the various management areas.

Catch and effort data were collected through on-site interviews during allowed harvest days at boat ramps for each of four ASMA sampling zones. Statistics were calculated through a non-uniform probability access-point creel survey (Pollock et al. 1994). Site probabilities were set in proportion to the likely use of a site according to time of day, day of week, and season. Probabilities for this survey were assigned based on seasonal striped bass fishing pressure observed during the past surveys, in addition to anecdotal information (NCDMF Sara Winslow and Kathy Rawls, NCDMF, personal communication). Probabilities can be adjusted during the survey period according to angler counts to provide more accurate estimates. Morning and

afternoon periods were assigned separate probabilities of conducting interviews, with each period representing half a fishing day. These values varied among sites within zones due to differing fishing pressure. A fishing day was defined as 1.5 hours after sunrise until 1.0 hour after sunset.

Striped bass sampled during the surveys were measured for TL (mm) and weighed to the nearest 0.1 kg. No scales were collected for ageing purposes. Estimations of age composition were based on age-length data provided by the IGNS and commercial harvest samples.

### Atlantic Ocean Migratory Stock

Amendment #5 to the ASMFC Interstate Striped Bass Management Plan allowed states to liberalize harvest in 1995 under the guidelines established in the amendment (ASMFC, 1995). Under Amendment #6, North Carolina was allowed an increase in the commercial harvest to a level equal to the average of the 1972-1979 harvest (480,480 lbs), which has remained in effect through 2011 (ASMFC, 2003). The TAC is split equally between the beach haul seine fishery, the gill net fishery, and the trawl fishery. Striped bass were sampled from these three fisheries. One major change occurred in the gear requirements for the beach seine fishery during the 2008/2009 season. Beach seines were required to be constructed of twine size no smaller than #9 (0.042 inches or 1.07 mm) in the wings and no smaller than # 12 (0.046 inches or 1.17 mm) in the bunt. Seines were to be constructed of stretched mesh size from 7 to 10 inches (inclusive) and shall be no more than 30 meshes deep. The gear changes were intended to reduce interactions with marine mammals in the beach seine fishery. Fish were obtained directly from fishermen and from fish dealers. North Carolina maintained a 28 in TL minimum size limit in its commercial striped bass fisheries in the Atlantic Ocean. Striped bass were measured to the nearest mm for FL and TL, weighed to the nearest 0.01 kg, and sexed using the Sykes (1958) method. Scales were collected, processed, and aged as described in Job 2.

Coded data from all samples were entered into the NCDMF Biological Database.

## **RESULTS AND DISCUSSION**

### **2010 - 2011**

#### Albemarle Sound Management Area Commercial Harvest – Fall 2010

The fall 2010 ASMA commercial fishery harvested 5,816 fish that weighed 23,181 lbs. The 2000 – 2007 year classes were represented, and the 2004 – 2007 year classes comprised 93.0% of the harvest. The male to female sex ratio of the harvest was 0.85:1.00 (Table 11).

A total of 224 fish were sampled of which 168 were aged. Average lengths and weights by year class for fish aged are presented in Table 12.

The length frequency was unimodal, and the 500-575 mm TL bins comprised 68.8% of the sample. The largest fish sampled was in the 900 mm TL bin (Figure 8).

#### Albemarle Sound Management Area Commercial Harvest – Spring 2011

The spring 2011 ASMA commercial fishery harvested 24,377 fish that weighed 111,241 lbs. The 2000-2007 year classes were represented in the sample. The 2006 and 2007 year classes comprised 87.7% of the harvest. The male:female ratio of the harvest was 1.00:0.99 (Table 13).

The length frequency was unimodal, and the 500-550 mm TL bins comprised 72.1% of the sample. The largest fish sampled was in the 1,200 mm TL bin (Figure 9).

#### Albemarle Sound Management Area Recreational Harvest – Fall 2010

The 2010 fall ASMA recreational harvest opened on 1 October and closed on 31 December 2010, for a total of 92 legal harvest days. The entire season was open to harvest seven days a week. Total harvest was estimated at 1,624 fish that weighed 5,393 lbs, with an additional 3,660 fish released. Approximately 88% of the fish were released because they were less than 18 in (457 mm) TL. There was an estimated 21,372 hours exerted targeting striped bass during the fall season. Length and weight data were collected for 132 striped bass during the fall survey. The length frequencies were unimodal, with 88.9% of the sample in the 450-550 mm TL bins (Figure 10). The 2002-2007 year classes were represented in the sample, and the 2005 and 2006 year classes comprised 65.9% of the sample (Table 15).

#### Albemarle Sound Management Area Recreational Harvest – Spring 2011

The 2011 spring ASMA recreational harvest opened on 1 January and closed on 30 April 2011, for a total of 120 legal harvest days. The entire season was open to harvest seven days a week. Total harvest was estimated at 5,845 fish that weighed 19,458 lbs, with an additional 13,813 fish released. Approximately 97% of the fish were released because they were less than 18 in (457 mm) TL. There was an estimated 45,042 hours exerted that targeted striped bass during the spring season. Length and weight data were collected for 137 striped bass during the spring survey. The length frequencies were unimodal, with 89% of the sample in the 450-525 mm TL bins (Figure 11). The 2003-2008 year classes were represented in the sample, and the 2006-2008 year classes comprised 84.0% of the sample (Table 16).

#### Atlantic Ocean Migratory Stock – December 2010-November 2011

The 2010/2011 Atlantic Ocean commercial striped bass fisheries harvested 10,701 fish that weighed 242,600 lbs (Table 17). Sex, FL and TL (mm), weight (kg) and age structures were obtained for 226 fish. Average lengths and weights by year class for fish aged are presented in Table 18.

The length frequencies were broadly unimodal and peaked at the 925 mm TL bin (Figure 12).

### **2006 – 2011**

#### Albemarle Sound Management Area Commercial Harvest – Fall 2006-2010

The 2006 – 2010 fall commercial fisheries harvested 28,592 fish that weighed 138,231 lbs. There were 16 year classes represented in the harvest (1992 – 2007). The 2002 and 2005 year classes both had the largest percent contribution at 18.5%, followed by the 2004 (15.4%), 2001 (13.0%), 2006 (10.4%), and 2003 (9.9%) year classes (Table 19). The fall harvest for the 2006 – 2011 seasons was much less than the fall harvest for the 2001 – 2005 seasons, which totaled 37,176 fish that weighed 215,253 lbs (Godwin and Winslow 2006). This was likely a result of the weak 2003 and 2004 year classes, both of which had JAI values that were at the spawning failure threshold (Figure 2).

The length frequencies were similar each year with the majority of fish contained in the 475-600 mm TL bins. The largest fish was in the 1,175 mm TL bin (Figure 8). Although there are occurrences of larger fish in the sample, mesh size regulations concentrate harvest on fish between three and six years old.

#### Albemarle Sound Management Area Commercial Harvest – Spring 2007-2011

The 2007 – 2011 spring commercial fisheries harvested 112,718 fish that weighed 549,841 lbs. There were 16 year classes represented in the harvest (1993 – 2008). The 2005 year class had the largest percent contribution at 23.0%, followed by the 2006 (22.7%), 2002 (12.5%), 2004 (11.5%), and 2003 (10.7%) year classes. The fact that the 2006 year class contributed 25,605 fish to the total harvest in only two years in which it was available to the fishery, compared to the 25,044 fish harvested from the 2003 and 2004 year classes in a combined nine years available to the fishery, further illustrates the unsuccessful spawns of the 2003 and 2004 year classes (Table 20). Like the fall harvest for the past segment, the spring harvest for 2007 – 2011 was much less than the 2001 – 2005 spring commercial seasons, which harvested 166,728 fish that weighed 957,340 lbs (Godwin and Winslow 2006).

Length frequencies for the spring commercial seasons were similar to the fall seasons and were concentrated around the 475 – 575 mm TL bins. The largest fish sampled was in the 1,200 mm TL bin (Figure 9).

#### Albemarle Sound Management Area Recreational Harvest – Fall 2006-2010

The 2006 – 2010 fall recreational fisheries harvested 21,664 fish that weighed 71,155 lbs. There were 11 year classes represented in the harvest (1997 – 2007). The 2005 year class had the largest percent contribution at 22.5%, followed by the 2001 (18.6%), 2002 (14.1%), 2004 (13.5%), 2006 (13.2%), and 2003 (12.4%) year classes (Table 15). In comparison, the fall recreational fishery from 2001 to 2005 harvested 65,484 fish that weighed 216,943 lbs (Godwin and Winslow 2006). Data from the creel survey indicated there were much fewer fish harvested from the Croatan Sound area during the fall recreational fishery when compared to 2001 – 2005, particularly around the Mann's Harbor Bridge. This fact is certainly due in part to a decrease in overall stock abundance compared to the late 1990s and early 2000s. The degree that other factors, such as availability of suitable bait or environmental conditions, have contributed to the declined harvest in the Croatan Sound area is not clear.

The majority of length frequencies for the fall recreational harvest are consistently within the 450 through 550 mm TL bins (Figure 10).

#### Albemarle Sound Management Area Recreational Harvest – Spring 2007-2011

The 2007 – 2011 spring recreational fisheries harvested 23,685 fish that weighed 76,989 lbs. There were 14 year classes represented in the harvest (1995 – 2008). The 2005 year class had the greatest contribution (30.7%), followed by the 2003 (15.0%), 2006 (12.6%), 2004 (11.4%), and the 2007 and 2002 year classes both at 10.4% (Table 16). In comparison, the spring recreational fishery for the previous 5 year period harvested 50,756 fish that weighed 173,487 lbs (Godwin and Winslow 2006).

Length frequencies were similar to the fall fishery with the majority of fish in the 450 – 550 mm TL bins. The largest fish was in the 750 mm TL bin (Figure 11).

## Atlantic Ocean Migratory Stock – December 2006-November 2011

The 2006/2007 – 2010/2011 Atlantic Ocean commercial fisheries harvested 63,433 fish that weighed 1,428,898 lbs. The 1991 – 2005 year classes were represented in the harvest (Table 21). The total annual harvest is determined by the availability of the Atlantic migratory stock to NC fishermen inside the NC state 3-mile jurisdictional boundary. During milder winters the bulk of the stock is often in VA state waters or in Federal waters and does not migrate as far south as NC. Harvest outside of three miles is not allowed. The Atlantic Ocean harvest for the previous five year period was 101,390 fish that weighed 1,962,050 lbs (Godwin and Winslow 2006).

Length frequencies are broadly unimodal and the majority of fish are in the 850 – 1,075 mm TL bins (Figure 12).

### **JOB 4: PHASE II STRIPED BASS TAGGING AND STOCKING**

#### **METHODS**

Striped bass brood stock were obtained from the spawning grounds in the Roanoke River and reared at the US Fish and Wildlife Service (USFWS) Edenton National Fish Hatchery, NC. Striped bass were grown out to Phase II size (127-254 mm TL) and released in natural striped bass nursery areas in two out of three NC river systems: 1) Tar/Pamlico River at Goose Creek State Park, 2) Neuse River at New Bern and 3) Cape Fear River at Wilmington; (Figure 13). There was a target of 100,000 Phase II striped bass to be stocked in each system. Phase II stockings have been conducted in two of the three systems on a rotating basis, while Phase I size (51-102 mm) stockings were conducted in the remaining system.

Starting in 2010 brood stock from the Cape Fear River was used to rear striped bass to Phase II size at the Watha State Hatchery for stocking into the Cape Fear River. Brood stock from the Roanoke continued to be used to rear striped bass at the Edenton National Fish Hatchery for Phase II stockings in the Tar/Pamlico and Neuse rivers. Beginning in 2012, endemic brood stock will be obtained from all three river systems to be reared to Phase II size and stocked into each system. The Watha State Hatchery will raise fish for the Cape Fear and the Edenton National Fish Hatchery will raise fish for the Tar/Pamlico and Neuse rivers. The current protocol will be to stock a target of 100,000 Phase II into each system annually, rather than into two systems on a rotating basis. Genetic material will also be obtained from brood stock and subsequent year classes to more accurately determine the percent contribution of hatchery fish to natural stocks in the three systems.

Prior to stocking, 3,000 Phase II fish for each system were tagged in the same manner as described in Job 2. A total of 9,000 tagged fish were stocked in each of the Tar/Pamlico, Neuse, and Cape Fear river systems to help determine hatchery contributions to the fisheries and spawning stock. Rewards were processed as described in Job 2.

#### **RESULTS AND DISCUSSION**

##### Phase II Striped Bass Tagging and Stocking – 2010

Approximately 420,081 Phase II striped bass were stocked into the Tar/Pamlico, Neuse, and Cape Fear rivers in December 2010 (Figure 13). Approximately 114,012 fish were stocked into the Tar/Pamlico, 107,142 fish were stocked in the Neuse River, and 198,927 fish were stocked into the Cape Fear River.

#### Phase II Striped Bass Tagging and Stocking – 2006-2010

During the 2006 Phase II stocking season, 99,595 and 102,283 fish were stocked in the Neuse and Cape Fear rivers respectively, of which 3,000 striped bass were tagged and stocked in each system.

In 2007, approximately 140,000 Phase II striped bass were stocked during November and December 2007, (70,000 each in the Neuse and Pamlico rivers) of which 6,000 were tagged (3,000 each system).

In 2008 approximately 185,121 Phase II striped bass were stocked, (~90,000 each in the Tar/Pamlico and Cape Fear rivers) of which 6,000 were tagged (3,000 each system).

In 2009 approximately 277,789 Phase II striped bass were stocked into the Neuse and Cape Fear river systems, of which 6,000 were tagged (3,000 each system). Approximately 104,061 fish were stocked into the Neuse River and 112,674 fish were stocked into the Cape Fear River. Due to excess production and low mortality rates, an additional 61,054 fish were able to be stocked into the Neuse River. Table 22 provides information on Phase I and Phase II stocking for 2006 – 2010.

## RECOMMENDATIONS

- Continue F-56 in order to provide the necessary data for assessments of the A/R striped bass stock and to meet the provisions of Amendment #6 to the Interstate Fishery Management Plan for Atlantic Striped Bass (ASMFC 2003)
- Continue and increase collection of habitat data such as SAV abundance, water quality, and changes in the riparian zone around the ASMA, especially in striped bass core nursery areas of western Albemarle Sound.
- Continue tagging striped bass in order to evaluate the possible contribution to the Atlantic Migratory stock and provide data to be used in stock assessment efforts. Develop means to assess the tag recapture rate for possible tag-based stock assessments.
- Investigate the use of the Oregon Inlet area by large striped bass to determine the percentage of Atlantic Migratory versus A/R stock. Enhance tagging and collection of otoliths for microchemistry evaluation to determine the origin of fish using this habitat.
- Collect striped bass discard mortality data in the recreational and commercial fisheries through observer trips and expanded creel surveys in the ASMA. Extend the Creel survey to year-round in order to assess the amount of hook-and-release mortality in the summer months.
- Coordinate an outreach program that incorporates known levels of mortalities at various water temperatures.
- Continue Phase II stocking and tagging programs to help sustain and increase populations during low levels of natural abundance, and continue to assess the contribution of hatchery fish to the population and fisheries. Support the evaluation of these stockings utilizing a genetic assessment methodology.
- Collect life history data for the A/R stock to determine key biological characteristics such as growth rates, maturation rates and fecundity every ten years. These data were updated last in 2012.
- Compare otolith and scale ageing for older fish.
- Evaluate the use of the near shore Atlantic Ocean off North Carolina, especially during the winter, through increased tagging in Croatan and Roanoke Sounds and Oregon Inlet, and increased effort between Hatteras and Oregon Inlets to recover such tags during the Cooperative Tagging Cruise.
- Expand juvenile and other sampling programs into the CSMA to better understand stock structure and the role of these stocks in state and federal waters.

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Table 1. Catch per unit effort (arithmetic mean) for young-of-year striped bass collected in juvenile abundance surveys, Albemarle Sound NC, 1955-2011.

| Year | Western Sound Trawls | Central Sound Trawls | Western Sound Beach Seine |
|------|----------------------|----------------------|---------------------------|
| 1955 | 3.3                  |                      |                           |
| 1956 | 19.1                 |                      |                           |
| 1957 | 5.7                  |                      |                           |
| 1958 | 0.2                  |                      |                           |
| 1959 | 23.9                 |                      |                           |
| 1960 | 5.9                  |                      |                           |
| 1961 | 10.3                 |                      |                           |
| 1962 | 7.9                  |                      |                           |
| 1963 | 4.8                  |                      |                           |
| 1964 | 3.1                  |                      |                           |
| 1965 | 10.1                 |                      |                           |
| 1966 | 3.5                  |                      |                           |
| 1967 | 23.4                 |                      |                           |
| 1968 | 6.6                  |                      |                           |
| 1969 | 3.0                  |                      |                           |
| 1970 | 12.5                 |                      |                           |
| 1971 | 2.9                  |                      |                           |
| 1972 | 2.5                  |                      |                           |
| 1973 | 2.0                  |                      |                           |
| 1974 | 5.5                  |                      |                           |
| 1975 | 10.8                 |                      |                           |
| 1976 | 10.5                 |                      |                           |
| 1977 | 3.6                  |                      |                           |
| 1978 | 0.6                  |                      |                           |
| 1979 | 0.6                  |                      |                           |
| 1980 | 0.5                  |                      |                           |
| 1981 | 0.1                  |                      |                           |
| 1982 | 3.8                  |                      |                           |
| 1983 | 0.8                  |                      |                           |
| 1984 | 0.4                  | 0.2                  |                           |
| 1985 | 1.2                  | 0.0                  |                           |
| 1986 | 0.1                  | 0.0                  |                           |
| 1987 | 0.1                  | 0.2                  |                           |
| 1988 | 4.1                  | 0.5                  |                           |
| 1989 | 4.3                  | 3.7                  |                           |
| 1990 | 1.4                  | 0.3                  |                           |
| 1991 | 0.9                  | 0.1                  |                           |
| 1992 | 2.6                  | 0.4                  |                           |
| 1993 | 44.5                 | 12.4                 | 20.9                      |
| 1994 | 38.2                 | 8.5                  | 37.1                      |
| 1995 | 9.9                  | 3.0                  | 2.4                       |
| 1996 | 31.5                 | 33.9                 | 39.5                      |
| 1997 | 5.4                  | 4.3                  | 12.4                      |
| 1998 | 7.0                  | 3.9                  | 1.2                       |
| 1999 | 0.8                  | 0.1                  | 0.1                       |
| 2000 | 58.8                 | 38.5                 | 30.2                      |
| 2001 | 3.3                  | 1.8                  | 1.9                       |
| 2002 | 7.3                  | 0.1                  | 1.7                       |
| 2003 | 0.3                  | 0.1                  | 0.2                       |
| 2004 | 1.7                  | 3.9                  | 2.3                       |
| 2005 | 34.6                 | 12.8                 | 12.3                      |
| 2006 | 3.0                  | 0.1                  | 1.5                       |
| 2007 | 7.2                  | 0.5                  | 4.5                       |
| 2008 | 6.6                  | 0.3                  | 5.1                       |
| 2009 | 0.4                  | 0.0                  | 1.6                       |
| 2010 | 8.9                  | 3.9                  | 0.7                       |
| 2011 | 15.1                 | 1.5                  | 10.6                      |
| Mean | 8.5                  | 4.8                  | 9.8                       |

Table 2. Number, mean TL (mm), and range TL (mm) of striped bass young-of-year collected during weekly beach seines in western Albemarle Sound, NC, 2011.

| Year 2011                   |       | Date   |        |        |       |        |        |
|-----------------------------|-------|--------|--------|--------|-------|--------|--------|
| Calendar Week               | 23    | 24     | 25     | 26     | 27    | 28     |        |
| Station                     | 7 Jun | 13 Jun | 21 Jun | 27 Jun | 7 Jul | 11-Jul | Totals |
| Albemarle Boat Plant (163S) | 0     | 0      | 3      | 6      | 0     | 0      | 9      |
| Cape Colony (153S)          | 0     | 27     | 13     | 4      | 32    | 9      | 85     |
| Edenton Bay (49S)           | 1     | 28     | 1      | 5      | 10    | 2      | 47     |
| Chowan River Bridge (46S)   | 2     | 3      | 14     | 13     | 6     | 22     | 60     |
| Black Walnut Point (139S)   | 3     | 29     | 26     | 35     | 15    | 25     | 133    |
| Avoca Farm (162S)           | 0     | 17     | 23     | 13     | 1     | 3      | 57     |
| Batchelor Bay (128S)        | 0     | 7      | 13     | 14     | 0     | 17     | 51     |
| Albemarle Beach (152S)      | 0     | 1      | 9      | 11     | 8     | 13     | 42     |
| West of Mackey's (129S)     | 45    | 1      | 3      | 22     | 1     | 14     | 86     |
| Totals                      | 51    | 113    | 105    | 123    | 73    | 105    | 570    |
| Mean TL mm                  | 31    | 41     | 47     | 49     | 54    | 60     | 48     |
| Range TL mm                 | 22-44 | 30-51  | 36-63  | 38-65  | 44-67 | 48-75  | 22-75  |
| CPUE                        | 5.7   | 12.6   | 11.7   | 13.7   | 8.1   | 11.7   | 10.6   |

Long term average = 9.8

Table 3. Number, mean TL (mm), and range TL (mm) of striped bass young-of-year collected during bi-weekly trawls in western Albemarle Sound, NC, 2011.

| Year 2011                |        |        |        | Date   |          |         |        |        |        |
|--------------------------|--------|--------|--------|--------|----------|---------|--------|--------|--------|
| Calendar Week            | 28     | 30     | 32     | 34     | 36       | 38      | 40     | 42     |        |
| Station                  | 13 Jul | 27 Jul | 10 Aug | 23 Aug | 7,8 Sept | 19 Sept | 3 Oct  | 18 Oct | Totals |
| Brickhouse (149)         | 3      | 27     | 29     | 8      | 126      | 1       | 30     | 11     | 235    |
| Nixons Beach (137)       | 26     | 8      | 0      | 17     | 6        | 30      | 2      | 42     | 131    |
| Georges Beach (150)      | 12     | 12     | 5      | 6      | 2        | 8       | 8      | 1      | 54     |
| Batemans Beach (151)     | 2      | 3      | 4      | 12     | 12       | 55      | 8      | 6      | 102    |
| Albemarle Beach (152)    | 11     | 2      | 1      | 0      | 6        | 8       | 2      | 5      | 35     |
| Black Walnut Point (139) | 1      | 10     | 21     | 5      | 1        | 0       | 4      | 15     | 57     |
| Cape Colony (153)        | 28     | 67     | 15     | 13     | 68       | 12      | 27     | 1      | 231    |
| Totals                   | 83     | 129    | 75     | 61     | 221      | 114     | 81     | 81     | 845    |
|                          |        |        |        |        |          |         |        |        |        |
| Mean TL mm               | 58     | 70     | 75     | 89     | 85       | 94      | 94     | 101    | 83     |
| Range TL mm              | 41-75  | 54-100 | 59-115 | 71-120 | 65-110   | 73-130  | 76-127 | 82-119 | 41-130 |
| CPUE                     | 11.9   | 18.4   | 10.7   | 8.7    | 31.6     | 16.3    | 11.6   | 11.6   | 15.1   |

Long term average = 8.5

Table 4. Number, mean TL (mm), and range TL (mm) of striped bass young-of-year collected during bi-weekly trawls in central Albemarle Sound, NC, 2011.

| Year 2011<br>Week            | Date   |        |           |          |         |         |           | Totals |
|------------------------------|--------|--------|-----------|----------|---------|---------|-----------|--------|
|                              | 29     | 31     | 33        | 35       | 37      | 39      | 41        |        |
| Station                      | 20 Jul | 2 Aug  | 16,17 Aug | 1,2 Sept | 13 Sept | 28 Sept | 10,12 Oct |        |
| Coast Guard Base (159)       | 0      | 3      | 0         | 0        | 0       | 0       | 0         | 3      |
| Pasquotank River Mouth (158) | 0      | 0      | 0         | 0        | 0       | 0       | 0         | 0      |
| Mid Sound (154)              | 0      | 0      | 0         | 0        | 0       | 0       | 0         | 0      |
| Alligator River Mouth (156)  | 0      | 0      | 0         | 0        | 0       | 0       | 0         | 0      |
| Barge Target (155)           | 0      | 0      | 0         | 0        | 0       | 0       | 1         | 1      |
| Dewey Pier (144)             | 0      | 0      | 0         | 0        | 0       | 0       | 0         | 0      |
| Laurel Point (142)           | 31     | 1      | 7         | 11       | 2       | 7       | 23        | 82     |
| Holiday Island (160)         | 2      | 0      | 3         | 1        | 0       | 0       | 0         | 6      |
| Harvey Point (157)           | 0      | 0      | 0         | 0        | 0       | 21      | 3         | 24     |
| Western Bull Bay (143)       | 1      | 0      | 3         | 4        | 0       | 0       | 1         | 9      |
| Little River Mouth (28)      | 0      | 0      | 0         | 0        | 0       | 0       | 0         | 0      |
| Big Flatty Mouth (134)       | 0      | 0      | 0         | 0        | 0       | 0       | 0         | 0      |
| Totals                       | 34     | 4      | 13        | 16       | 2       | 28      | 28        | 125    |
| Mean TL mm                   | 75     | 96     | 88        | 93       | 101     | 116     | 113       |        |
| Range TL mm                  | 64-85  | 78-117 | 77-116    | 75-116   | 100-102 | 100-138 | 99-146    | 64-146 |
| CPUE                         | 2.8    | 0.3    | 1.1       | 1.3      | 0.2     | 2.3     | 2.3       | 1.5    |

Longterm average = 5.4

Table 5. Number of striped bass young-of-year collected during juvenile surveys, Albemarle Sound, NC, 2006-2011.

| Station                            | Year       |            |            |            |             | Station Total | Station CPUE |
|------------------------------------|------------|------------|------------|------------|-------------|---------------|--------------|
|                                    | 2007       | 2008       | 2009       | 2010       | 2011        |               |              |
| <b><u>Beach Seines</u></b>         |            |            |            |            |             |               |              |
| Albemarle Boat Plant (163S)        | 34         | 19         | 2          | 0          | 9           | <b>64</b>     | <b>2.1</b>   |
| Cape Colony (153S)                 | 31         | 15         | 11         | 0          | 85          | <b>142</b>    | <b>4.7</b>   |
| Edenton Bay (49S)                  | 24         | 1          | 18         | 0          | 47          | <b>90</b>     | <b>3.0</b>   |
| Chowan River Bridge (46S)          | 75         | 80         | 16         | 4          | 60          | <b>235</b>    | <b>7.8</b>   |
| Black Walnut Point (139S)          | 27         | 122        | 27         | 2          | 133         | <b>311</b>    | <b>10.4</b>  |
| Avoca Farm (162S)                  | 9          | 0          | 12         | 0          | 57          | <b>78</b>     | <b>2.6</b>   |
| Batchelor Bay (128S)               | 20         | 10         | 2          | 0          | 51          | <b>83</b>     | <b>2.8</b>   |
| Albemarle Beach (152S)             | 20         | 15         | 0          | 26         | 42          | <b>103</b>    | <b>3.4</b>   |
| West of Mackey's (129S)            | 5          | 16         | 0          | 6          | 86          | <b>113</b>    | <b>3.8</b>   |
| <b>Yearly Totals</b>               | <b>245</b> | <b>278</b> | <b>88</b>  | <b>38</b>  | <b>570</b>  | <b>1,219</b>  |              |
| <b>Yearly CPUE</b>                 | <b>4.5</b> | <b>5.1</b> | <b>1.6</b> | <b>0.7</b> | <b>10.6</b> |               |              |
| <b>5-yr CPUE</b>                   |            |            |            |            |             | <b>4.5</b>    |              |
| <b><u>Western Sound Trawls</u></b> |            |            |            |            |             |               |              |
| Brickhouse (149)                   | 61         | 8          | 2          | 37         | 231         | <b>339</b>    | <b>8.5</b>   |
| Nixons Beach (137)                 | 11         | 16         | 0          | 105        | 57          | <b>189</b>    | <b>4.7</b>   |
| Georges Beach (150)                | 22         | 4          | 0          | 31         | 102         | <b>159</b>    | <b>4.0</b>   |
| Batemans Beach (151)               | 94         | 73         | 4          | 124        | 35          | <b>330</b>    | <b>8.3</b>   |
| Albemarle Beach (152)              | 135        | 198        | 14         | 69         | 54          | <b>470</b>    | <b>11.8</b>  |
| Black Walnut Point (139)           | 44         | 61         | 3          | 47         | 131         | <b>286</b>    | <b>7.2</b>   |
| Cape Colony (153)                  | 36         | 7          | 2          | 87         | 235         | <b>367</b>    | <b>9.2</b>   |
| <b>Yearly Totals</b>               | <b>403</b> | <b>367</b> | <b>25</b>  | <b>500</b> | <b>845</b>  | <b>2,140</b>  |              |
| <b>Yearly CPUE</b>                 | <b>7.2</b> | <b>7.1</b> | <b>0.4</b> | <b>8.9</b> | <b>15.1</b> |               |              |
| <b>5-yr CPUE</b>                   |            |            |            |            |             | <b>7.6</b>    |              |
| <b><u>Central Sound Trawls</u></b> |            |            |            |            |             |               |              |
| Coast Guard Base (159)             | 6          | 0          | 0          | 2          | 0           | <b>8</b>      | <b>0.2</b>   |
| Pasquotank River Mouth (158)       | 0          | 0          | 0          | 0          | 0           | <b>0</b>      | <b>0.0</b>   |
| Mid Sound (154)                    | 0          | 0          | 0          | 0          | 0           | <b>0</b>      | <b>0.0</b>   |
| Alligator River Mouth (156)        | 0          | 0          | 0          | 0          | 3           | <b>3</b>      | <b>0.1</b>   |
| Barge Target (155)                 | 0          | 0          | 0          | 148        | 82          | <b>230</b>    | <b>6.6</b>   |
| Dewey Pier (144)                   | 7          | 7          | 0          | 12         | 24          | <b>50</b>     | <b>1.4</b>   |
| Laurel Point (142)                 | 24         | 18         | 0          | 67         | 0           | <b>109</b>    | <b>3.1</b>   |
| Holiday Island (160)               | 4          | 0          | 0          | 0          | 0           | <b>4</b>      | <b>0.1</b>   |
| Harvey Point (157)                 | 1          | 0          | 0          | 53         | 6           | <b>60</b>     | <b>1.7</b>   |
| Western Bull Bay (143)             | 0          | 0          | 0          | 10         | 9           | <b>19</b>     | <b>0.5</b>   |
| Little River Mouth (28)            | 0          | 0          | 0          | 25         | 0           | <b>25</b>     | <b>0.7</b>   |
| Big Flatty Mouth (134)             | 0          | 0          | 0          | 10         | 1           | <b>11</b>     | <b>0.3</b>   |
| <b>Yearly Totals</b>               | <b>42</b>  | <b>25</b>  | <b>0</b>   | <b>327</b> | <b>125</b>  | <b>519</b>    | <b>14.8</b>  |
| <b>Yearly CPUE</b>                 | <b>0.5</b> | <b>0.3</b> | <b>0.0</b> | <b>3.9</b> | <b>1.5</b>  |               |              |
| <b>5-yr CPUE</b>                   |            |            |            |            |             | <b>1.2</b>    |              |

Table 6. Catch per unit effort (CPUE) from the fall/winter and spring Independent Gill Net Surveys, conducted in the Albemarle and Croatan Sounds, NC, 1990-2011.

| F/W Segment | Effort | N     | CPUE | Spring Segment | Effort | N     | CPUE |
|-------------|--------|-------|------|----------------|--------|-------|------|
| 1990/91     | 1,469  | 1,396 | 0.95 | 1991           | 1,964  | 2,084 | 1.06 |
| 1991/92     | 2,483  | 1,093 | 0.44 | 1992           | 2,330  | 1,091 | 0.47 |
| 1992/93     | 2,286  | 899   | 0.39 | 1993           | 2,230  | 614   | 0.28 |
| 1993/94     | 2,302  | 985   | 0.43 | 1994           | 2,032  | 413   | 0.20 |
| 1994/95     | 2,274  | 1,621 | 0.71 | 1995           | 1,950  | 1,989 | 1.02 |
| 1995/96     | 2,259  | 715   | 0.32 | 1996           | 1,883  | 1,227 | 0.65 |
| 1996/97     | 2,291  | 1,479 | 0.65 | 1997           | 1,925  | 1,707 | 0.89 |
| 1997/98     | 2,256  | 1,225 | 0.54 | 1998           | 1,909  | 1,961 | 1.03 |
| 1998/99     | 2,292  | 2,196 | 0.96 | 1999           | 1,991  | 2,302 | 1.16 |
| 1999/00     | 2,274  | 1,129 | 0.50 | 2000           | 2,011  | 1,829 | 0.91 |
| 2000/01     | 2,275  | 844   | 0.37 | 2001           | 1,867  | 1,789 | 0.96 |
| 2001/02     | 2,266  | 1,131 | 0.50 | 2002           | 1,850  | 1,623 | 0.88 |
| 2002/03     | 2,289  | 736   | 0.32 | 2003           | 2,166  | 884   | 0.41 |
| 2003/04     | 2,208  | 1,745 | 0.79 | 2004           | 1,948  | 1,886 | 0.97 |
| 2004/05     | 2,256  | 1,104 | 0.49 | 2005           | 1,964  | 1,451 | 0.74 |
| 2005/06     | 2,271  | 1,422 | 0.63 | 2006           | 1,934  | 1,906 | 0.99 |
| 2006/07     | 2,264  | 482   | 0.21 | 2007           | 1,923  | 973   | 0.51 |
| 2007/08     | 2,235  | 1,752 | 0.78 | 2008           | 1,801  | 2,417 | 1.34 |
| 2008/09     | 2,275  | 1,084 | 0.48 | 2009           | 1,559  | 1,204 | 0.77 |
| 2009/10     | 2,276  | 1,138 | 0.50 | 2010           | 1,362  | 1,415 | 1.04 |
| 2010/11     | 2,276  | 1,200 | 0.53 | 2011           | 1,447  | 1,721 | 1.19 |
| Average     | 2,242  | 1,208 | 0.55 |                | 1,907  | 1,547 | 0.83 |

Table 7. Year class composition, total length (mm), and weight (kg) data taken from a subsample of striped bass collected during the fall/winter Independent Gill Net Survey conducted in the Albemarle and Croatan Sounds, NC, 2010/2011. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

| Year Class     | N Aged | N Expanded | N Total | % Comp | Total Length (mm) |     |     | Weight (kg) |      |      |
|----------------|--------|------------|---------|--------|-------------------|-----|-----|-------------|------|------|
|                |        |            |         |        | Mean              | Min | Max | Mean        | Min  | Max  |
| <u>Male</u>    |        |            |         |        |                   |     |     |             |      |      |
| 2009           | 16     | 1          | 17      | 1.4    | 354 (26)          | 263 | 395 | 0.50 (0.09) | 0.23 | 0.64 |
| 2008           | 47     | 103        | 150     | 12.6   | 432 (24)          | 372 | 483 | 1.00 (0.20) | 0.62 | 1.49 |
| 2007           | 17     | 6          | 23      | 1.9    | 482 (14)          | 450 | 502 | 1.35 (0.16) | 1.01 | 1.58 |
| 2006           | 10     | 3          | 13      | 1.1    | 503 (17)          | 477 | 533 | 1.64 (0.23) | 1.27 | 2.05 |
| 2005           | 17     | 0          | 17      | 1.4    | 519 (13)          | 500 | 537 | 1.81 (0.23) | 1.42 | 2.30 |
| 2004           | 2      | 0          | 2       | 0.2    | 561 (11)          | 553 | 568 | 2.31 (0.11) | 2.23 | 2.38 |
| <u>Female</u>  |        |            |         |        |                   |     |     |             |      |      |
| 2009           | 22     | 6          | 28      | 2.4    | 342 (26)          | 267 | 387 | 0.46 (0.11) | 0.18 | 0.68 |
| 2008           | 49     | 95         | 144     | 12.1   | 439 (22)          | 394 | 483 | 1.01 (0.18) | 0.56 | 1.34 |
| 2007           | 13     | 1          | 14      | 1.2    | 492 (13)          | 473 | 516 | 1.52 (0.20) | 1.12 | 1.81 |
| 2006           | 11     | 0          | 11      | 0.9    | 512 (16)          | 495 | 553 | 1.62 (0.16) | 1.39 | 1.94 |
| 2005           | 8      | 0          | 8       | 0.7    | 528 (15)          | 513 | 550 | 1.83 (0.17) | 1.62 | 2.08 |
| 2004           | 8      | 0          | 8       | 0.7    | 578 (18)          | 557 | 612 | 2.42 (0.30) | 2.00 | 2.95 |
| 2003           | 2      | 0          | 2       | 0.2    | 553 (2)           | 551 | 554 | 2.42 (0.25) | 2.24 | 2.60 |
| <u>Unknown</u> |        |            |         |        |                   |     |     |             |      |      |
| 2010           | 3      | 2          | 5       | 0.4    | 315 (57)          | 255 | 368 |             |      |      |
| 2009           | 11     | 53         | 64      | 5.4    | 377 (20)          | 291 | 399 |             |      |      |
| 2008           | 8      | 366        | 374     | 31.4   | 391 (5)           | 384 | 398 |             |      |      |
| 2007           | 0      | 128        | 128     | 10.7   |                   |     |     |             |      |      |
| 2006           | 3      | 64         | 67      | 5.6    | 563 (39)          | 531 | 606 |             |      |      |
| 2005           | 8      | 75         | 83      | 7.0    | 547 (22)          | 514 | 586 |             |      |      |
| 2004           | 17     | 8          | 25      | 2.1    | 573 (34)          | 538 | 682 |             |      |      |
| 2003           | 5      | 0          | 5       | 0.4    | 617 (72)          | 556 | 705 |             |      |      |
| 2002           | 1      | 1          | 2       | 0.2    | 620               | 620 | 620 |             |      |      |
| 2001           | 0      |            | 0       | 0.0    |                   |     |     |             |      |      |
| 2000           | 1      | 0          | 1       | 0.1    | 756               | 756 | 756 |             |      |      |
| Totals         | 279    | 912        | 1,191   | 100.0  |                   |     |     |             |      |      |



Table 8. Year class composition, total length (mm), and weight (kg) data taken from a subsample of striped bass collected during the spring Independent Gill Net Survey conducted in the western Albemarle Sound, NC, 2011. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

| Year Class     | N<br>Aged | N<br>Expanded | N<br>Total | %<br>Comp | Total Length (mm) |     |     | Weight (kg)  |      |       |
|----------------|-----------|---------------|------------|-----------|-------------------|-----|-----|--------------|------|-------|
|                |           |               |            |           | Mean              | Min | Max | Mean         | Min  | Max   |
| <u>Male</u>    |           |               |            |           |                   |     |     |              |      |       |
| 2009           | 47        | 121           | 168        | 9.8       | 363 (25)          | 274 | 408 | 0.51 (0.10)  | 0.19 | 0.77  |
| 2008           | 45        | 265           | 310        | 18.1      | 443 (25)          | 385 | 485 | 1.00 (0.24)  | 0.62 | 1.59  |
| 2007           | 17        | 47            | 64         | 3.7       | 499 (27)          | 458 | 552 | 1.52 (0.33)  | 1.11 | 2.30  |
| 2006           | 17        | 29            | 46         | 2.7       | 531 (30)          | 485 | 584 | 1.73 (0.22)  | 1.29 | 2.15  |
| 2005           | 11        | 19            | 30         | 1.7       | 561 (37)          | 520 | 622 | 2.13 (0.30)  | 1.86 | 2.76  |
| 2004           | 9         | 5             | 14         | 0.8       | 633 (93)          | 557 | 787 | 3.08 (1.12)  | 2.23 | 5.10  |
| 2003           | 1         | 0             | 1          | 0.1       | 731               |     |     |              |      |       |
| <u>Female</u>  |           |               |            |           |                   |     |     |              |      |       |
| 2010           | 1         | 0             | 1          | 0.1       | 204               |     |     | 0.14         |      |       |
| 2009           | 61        | 177           | 238        | 13.9      | 354 (34)          | 258 | 414 | 0.49 (0.14)  | 0.16 | 0.83  |
| 2008           | 46        | 262           | 308        | 18.0      | 445 (25)          | 390 | 504 | 0.96 (0.18)  | 0.65 | 1.33  |
| 2007           | 25        | 52            | 77         | 4.5       | 507 (23)          | 463 | 558 | 1.49 (0.23)  | 1.00 | 1.83  |
| 2006           | 10        | 10            | 20         | 1.2       | 550 (19)          | 520 | 569 | 1.99 (0.16)  | 1.84 | 2.27  |
| 2005           | 11        | 8             | 19         | 1.1       | 569 (32)          | 528 | 650 | 2.25 (0.50)  | 1.75 | 3.59  |
| 2004           | 10        | 3             | 13         | 0.8       | 620 (59)          | 528 | 726 | 3.04 (1.23)  | 1.48 | 5.30  |
| 2003           | 3         | 0             | 3          | 0.2       | 682 (95)          | 610 | 790 | 2.94         |      |       |
| 2000           | 2         | 0             | 2          | 0.1       | 932 (7)           | 927 | 937 | 10.10 (1.27) | 9.20 | 11.00 |
| <u>Unknown</u> |           |               |            |           |                   |     |     |              |      |       |
| 2009           | 8         | 104           | 112        | 6.5       | 292 (36)          | 251 | 346 | 0.46         | 0.46 | 0.46  |
| 2008           | 0         | 199           | 199        | 11.6      |                   |     |     |              |      |       |
| 2007           | 0         | 60            | 60         | 3.5       |                   |     |     |              |      |       |
| 2006           | 2         | 17            | 19         | 1.1       | 590 (1)           | 589 | 590 |              |      |       |
| 2005           | 3         | 4             | 7          | 0.4       | 604 (47)          | 556 | 650 |              |      |       |
| 2004           | 0         | 4             | 4          | 0.2       |                   |     |     |              |      |       |
| Totals         | 329       | 1,386         | 1,715      | 100.0     |                   |     |     |              |      |       |

Table 9. Year class composition from the fall/winter Independent Gill Net Survey conducted in the Albemarle and Croatan sounds, NC, 2006/2007 – 2010/2011.

| Year Class | Survey Year |        |           |        |           |        |           |        |           |        |        |        |
|------------|-------------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|--------|--------|
|            | 2006/2007   |        | 2007/2008 |        | 2008/2009 |        | 2009/2010 |        | 2010/2011 |        | Totals |        |
|            | N           | %      | N         | %      | N         | %      | N         | %      | N         | %      | N      | %      |
| 2010       |             |        |           |        |           |        |           |        | 5         | 0.42   | 5      | 0.09   |
| 2009       |             |        |           |        |           |        |           |        | 109       | 9.15   | 109    | 1.93   |
| 2008       |             |        |           |        |           |        | 703       | 61.83  | 668       | 56.09  | 1,371  | 24.33  |
| 2007       |             |        |           |        | 176       | 16.24  | 175       | 15.39  | 165       | 13.85  | 516    | 9.16   |
| 2006       |             |        | 277       | 15.92  | 257       | 23.71  | 65        | 5.72   | 91        | 7.64   | 690    | 12.25  |
| 2005       | 73          | 15.15  | 1,173     | 67.41  | 584       | 53.87  | 172       | 15.13  | 108       | 9.07   | 2,110  | 37.45  |
| 2004       | 164         | 34.02  | 219       | 12.59  | 52        | 4.80   | 17        | 1.50   | 35        | 2.94   | 487    | 8.64   |
| 2003       | 28          | 5.81   | 35        | 2.01   | 12        | 1.11   | 4         | 0.35   | 7         | 0.59   | 86     | 1.53   |
| 2002       | 104         | 21.58  | 19        | 1.09   | 2         | 0.18   | 1         | 0.09   | 2         | 0.17   | 128    | 2.27   |
| 2001       | 102         | 21.16  | 14        | 0.80   | 1         | 0.09   |           |        |           |        | 117    | 2.08   |
| 2000       | 11          | 2.28   | 2         | 0.11   |           |        |           |        | 1         | 0.08   | 14     | 0.25   |
| 1999       |             |        |           |        |           |        |           |        |           |        | 0      | 0.00   |
| 1998       |             |        | 1         | 0.06   |           |        |           |        |           |        | 1      | 0.02   |
| Totals     | 482         | 100.00 | 1,740     | 100.00 | 1,084     | 100.00 | 1,137     | 100.00 | 1,191     | 100.00 | 5,634  | 100.00 |

Table 10. Year class composition from the spring Independent Gill Net Survey conducted in western Albemarle Sound, NC, 2007 – 2011.

| Year<br>Class | Survey Year |        |       |        |       |        |       |        |       |        |        |        |
|---------------|-------------|--------|-------|--------|-------|--------|-------|--------|-------|--------|--------|--------|
|               | 2007        |        | 2008  |        | 2009  |        | 2010  |        | 2011  |        | Totals |        |
|               | N           | %      | N     | %      | N     | %      | N     | %      | N     | %      | N      | %      |
| 2010          |             |        |       |        |       |        |       |        | 1     | 0.06   | 1      | 0.01   |
| 2009          |             |        |       |        |       |        | 2     | 0.14   | 518   | 30.20  | 520    | 6.73   |
| 2008          |             |        |       |        | 3     | 0.25   | 1,072 | 75.76  | 817   | 47.64  | 1,892  | 24.49  |
| 2007          |             |        | 3     | 0.12   | 394   | 32.70  | 183   | 12.93  | 201   | 11.72  | 781    | 10.11  |
| 2006          | 1           | 0.10   | 479   | 19.85  | 528   | 43.82  | 72    | 5.09   | 85    | 4.96   | 1,165  | 15.08  |
| 2005          | 375         | 38.34  | 1,736 | 71.94  | 211   | 17.51  | 67    | 4.73   | 56    | 3.27   | 2,445  | 31.65  |
| 2004          | 218         | 22.29  | 67    | 2.78   | 35    | 2.90   | 13    | 0.92   | 31    | 1.81   | 364    | 4.71   |
| 2003          | 142         | 14.52  | 67    | 2.78   | 17    | 1.41   | 1     | 0.07   | 4     | 0.23   | 231    | 2.99   |
| 2002          | 152         | 15.54  | 48    | 1.99   | 6     | 0.50   | 2     | 0.14   |       |        | 208    | 2.69   |
| 2001          | 54          | 5.52   | 5     | 0.21   | 5     | 0.41   | 3     | 0.21   |       |        | 67     | 0.87   |
| 2000          | 13          | 1.33   | 3     | 0.12   | 3     | 0.25   |       |        | 2     | 0.12   | 21     | 0.27   |
| 1999          | 12          | 1.23   | 2     | 0.08   | 1     | 0.08   |       |        |       |        | 15     | 0.19   |
| 1998          | 4           | 0.41   | 1     | 0.04   |       |        |       |        |       |        | 5      | 0.06   |
| 1997          | 3           | 0.31   |       |        | 1     | 0.08   |       |        |       |        | 4      | 0.05   |
| 1996          | 2           | 0.20   |       |        |       |        |       |        |       |        | 2      | 0.03   |
| 1995          | 2           | 0.20   | 1     | 0.04   | 1     | 0.08   |       |        |       |        | 4      | 0.05   |
| 1994          |             |        |       |        |       |        |       |        |       |        |        |        |
| 1993          |             |        | 1     | 0.04   |       |        |       |        |       |        | 1      | 0.01   |
| Totals        | 978         | 100.00 | 2,413 | 100.00 | 1,205 | 100.00 | 1,415 | 100.00 | 1,715 | 100.00 | 7,726  | 100.00 |

Table 11. Pounds and estimated number of striped bass by year class and sex harvested during the fall commercial harvest, Albemarle Sound Management Area, NC 2010.

| Year Class | Male  |        |            | Female |        |            | Totals |        |            |
|------------|-------|--------|------------|--------|--------|------------|--------|--------|------------|
|            | N     | LBS    | % Comp (N) | N      | LBS    | % Comp (N) | N      | LBS    | % Comp (N) |
| 2007       | 511   | 1,364  | 8.8        | 418    | 1,154  | 7.2        | 928    | 2,517  | 16.0       |
| 2006       | 962   | 3,147  | 16.5       | 737    | 2,517  | 12.7       | 1,699  | 5,664  | 29.2       |
| 2005       | 794   | 3,357  | 13.7       | 1,038  | 4,405  | 17.8       | 1,832  | 7,762  | 31.5       |
| 2004       | 293   | 1,364  | 5.0        | 654    | 3,147  | 11.2       | 947    | 4,510  | 16.3       |
| 2003       | 84    | 629    | 1.4        | 206    | 1,154  | 3.5        | 290    | 1,783  | 5.0        |
| 2002       | 33    | 210    | 0.6        | 46     | 315    | 0.8        | 78     | 524    | 1.3        |
| 2001       |       |        |            | 34     | 315    | 0.6        | 34     | 315    | 0.6        |
| 2000       |       |        |            | 6      | 105    | 0.1        | 6      | 105    | 0.1        |
| Totals     | 2,676 | 10,070 | 46.0       | 3,139  | 13,111 | 54.0       | 5,816  | 23,181 | 100.0      |

Note. Table may not add due to rounding.

Table 12. Year class composition, total length (mm) and weight (kg) data for striped bass sampled from the fall commercial harvest, Albemarle Sound Management Area, NC 2010. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

| Year Class    | N Aged | Total Length (mm) |     |     | Weight (kg) |      |      |
|---------------|--------|-------------------|-----|-----|-------------|------|------|
|               |        | Mean              | Min | Max | Mean        | Min  | Max  |
| <u>Male</u>   |        |                   |     |     |             |      |      |
| 2007          | 10     | 474(15)           | 460 | 507 | 1.24(0.28)  | 1.00 | 1.95 |
| 2006          | 24     | 508(16)           | 474 | 535 | 1.47(0.23)  | 1.15 | 1.89 |
| 2005          | 20     | 546(27)           | 505 | 605 | 1.96(0.33)  | 1.56 | 2.55 |
| 2004          | 11     | 573(32)           | 540 | 649 | 2.11(0.49)  | 1.17 | 3.27 |
| 2003          | 5      | 653(30)           | 612 | 683 | 3.35(0.88)  | 2.34 | 4.28 |
| 2002          | 2      | 677(66)           | 630 | 724 | 2.91(0.97)  | 2.22 | 3.59 |
| <u>Female</u> |        |                   |     |     |             |      |      |
| 2007          | 10     | 481(12)           | 467 | 500 | 1.23(0.17)  | 0.98 | 1.57 |
| 2006          | 17     | 518(32)           | 485 | 608 | 1.54(0.42)  | 1.10 | 2.79 |
| 2005          | 30     | 556(31)           | 505 | 617 | 1.97(0.37)  | 1.40 | 2.90 |
| 2004          | 23     | 583(36)           | 526 | 650 | 2.24(0.39)  | 1.50 | 3.14 |
| 2003          | 9      | 614(35)           | 570 | 670 | 2.61(0.45)  | 2.05 | 3.54 |
| 2002          | 3      | 669(50)           | 632 | 725 | 3.12(0.45)  | 2.84 | 3.64 |
| 2001          | 3      | 734(62)           | 665 | 783 | 4.16(1.48)  |      | 5.50 |
| 2000          | 1      | 924               |     |     |             |      | 7.90 |
| Totals        | 168    |                   |     |     |             |      |      |

Table 13. Pounds and estimated number of striped bass by year class and sex harvested during the spring commercial harvest, Albemarle Sound Management Area, NC 2011.

| Year Class | Male   |        |            | Female |        |            | Totals |         |            |
|------------|--------|--------|------------|--------|--------|------------|--------|---------|------------|
|            | N      | LBS    | % Comp (N) | N      | LBS    | % Comp (N) | N      | LBS     | % Comp (N) |
| 2007       | 6,173  | 22,217 | 25.3       | 4,160  | 15,990 | 17.1       | 10,332 | 38,207  | 42.4       |
| 2006       | 6,173  | 26,656 | 25.3       | 4,875  | 23,005 | 20.0       | 11,048 | 49,661  | 45.3       |
| 2005       | 850    | 4,713  | 3.5        | 850    | 5,076  | 3.5        | 1,700  | 9,789   | 7.0        |
| 2004       | 313    | 2,435  | 1.3        | 313    | 2,381  | 1.3        | 626    | 4,816   | 2.6        |
| 2003       | 268    | 2,754  | 1.1        | 89     | 773    | 0.4        | 358    | 3,527   | 1.5        |
| 2002       | 45     | 779    | 0.2        | 89     | 1,021  | 0.4        | 134    | 1,800   | 0.6        |
| 2001       | 45     | 907    | 0.2        | 89     | 1,657  | 0.4        | 134    | 2,564   | 0.6        |
| 2000       |        |        |            | 45     | 878    | 0.2        | 45     | 878     | 0.2        |
| Totals     | 13,866 | 60,461 | 56.9       | 10,511 | 49,903 | 43.1       | 24,377 | 111,241 | 100.0      |

Note. Table may not add due to rounding.

Table 14. Year class composition, total length (mm) and weight (kg) data for striped bass sampled from the spring commercial harvest, Albemarle Sound Management Area, NC 2011. Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

| Year Class    | N Aged | Total Length (mm) |     |     | Weight (kg) |      |      |
|---------------|--------|-------------------|-----|-----|-------------|------|------|
|               |        | Mean              | Min | Max | Mean        | Min  | Max  |
| <u>Male</u>   |        |                   |     |     |             |      |      |
| 2007          | 41     | 491 (25)          | 451 | 553 | 1.48 (0.24) | 1.05 | 1.94 |
| 2006          | 32     | 546 (27)          | 495 | 617 | 2.10 (0.22) | 1.61 | 2.58 |
| 2005          | 15     | 604 (29)          | 564 | 660 | 2.59 (0.29) | 2.20 | 3.18 |
| 2004          | 7      | 677 (64)          | 592 | 768 | 3.53 (0.69) | 2.81 | 4.70 |
| 2003          | 6      | 730 (57)          | 647 | 811 | 4.66 (1.33) | 3.20 | 6.75 |
| 2002          | 1      | 870               | 870 | 870 | 7.90        |      |      |
| 2001          | 1      | 905               | 905 | 905 | 9.20        |      |      |
| <u>Female</u> |        |                   |     |     |             |      |      |
| 2007          | 40     | 511 (27)          | 465 | 566 | 1.59 (0.28) | 1.03 | 2.05 |
| 2006          | 38     | 567 (29)          | 490 | 618 | 2.29 (0.32) | 1.53 | 2.97 |
| 2005          | 11     | 606 (20)          | 580 | 642 | 2.86 (0.19) | 2.63 | 3.20 |
| 2004          | 7      | 671 (39)          | 632 | 746 | 3.45 (0.34) | 2.86 | 4.00 |
| 2003          | 2      | 723 (61)          | 662 | 784 | 3.92 (0.40) | 3.64 | 4.20 |
| 2002          | 2      | 816 (14)          | 802 | 829 | 5.18 (0.11) | 5.10 | 5.25 |
| 2001          | 2      | 902 (17)          | 885 | 919 | 8.40 (1.41) | 7.40 | 9.40 |
| 2000          | 1      | 997               | 997 | 997 | 8.90        |      |      |
| Totals        | 206    |                   |     |     |             |      |      |

Table 15. Estimated number of striped bass by year class harvested during the fall Albemarle Sound Management Area recreational fishery, 2006 – 2010, NC.

| Year Class | 2006  |       | 2007  |       | 2008  |       | 2009  |       | 2010  |       | Totals |       |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
|            | N     | %     | N     | %     | N     | %     | N     | %     | N     | %     | N      | %     |
| 2007       |       |       |       |       |       |       |       |       | 212   | 13.1  | 212    | 1.0   |
| 2006       |       |       |       |       |       |       | 2,300 | 58.9  | 563   | 34.7  | 2,863  | 13.2  |
| 2005       |       |       |       |       | 3,188 | 46.7  | 1,172 | 30.0  | 506   | 31.2  | 4,866  | 22.5  |
| 2004       | 48    | 0.7   | 242   | 9.4   | 2,138 | 31.3  | 217   | 5.6   | 277   | 17.1  | 2,922  | 13.5  |
| 2003       | 713   | 10.6  | 754   | 29.3  | 1,080 | 15.8  | 93    | 2.4   | 57    | 3.5   | 2,697  | 12.4  |
| 2002       | 1,571 | 23.3  | 1,053 | 40.9  | 366   | 5.4   | 46    | 1.2   | 8     | 0.5   | 3,044  | 14.1  |
| 2001       | 3,565 | 52.9  | 399   | 15.5  | 23    | 0.3   | 46    | 1.2   |       |       | 4,033  | 18.6  |
| 2000       | 786   | 11.7  | 93    | 3.6   | 25    | 0.4   | 15    | 0.4   |       |       | 919    | 4.2   |
| 1999       | 0     | 0.0   | 23    | 0.9   |       |       |       |       |       |       | 23     | 0.1   |
| 1998       | 60    | 0.9   |       |       |       |       |       |       |       |       | 60     | 0.3   |
| 1997       |       |       | 10    | 0.4   |       |       | 15    | 0.4   |       |       | 25     | 0.1   |
| Totals     | 6,743 | 100.0 | 2,574 | 100.0 | 6,820 | 100.0 | 3,904 | 100.0 | 1,624 | 100.0 | 21,664 | 100.0 |

Note. Table may not add due to rounding.

Table 16. Estimated number of striped bass by year class harvested during the spring Albemarle Sound Management Area recreational fishery, 2007 – 2011, NC.

| Year Class | 2007  |       | 2008  |       | 2009  |       | 2010  |       | 2011  |       | Totals |       |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
|            | N     | %     | N     | %     | N     | %     | N     | %     | N     | %     | N      | %     |
| 2008       |       |       |       |       |       |       |       |       | 1,588 | 27.2  | 1,588  | 6.7   |
| 2007       |       |       |       |       |       |       | 232   | 12.3  | 2,232 | 38.2  | 2,464  | 10.4  |
| 2006       |       |       |       |       | 1,340 | 16.4  | 568   | 30.2  | 1,085 | 18.6  | 2,993  | 12.6  |
| 2005       |       |       | 670   | 20.8  | 5,143 | 63.0  | 824   | 43.8  | 636   | 10.9  | 7,273  | 30.7  |
| 2004       | 290   | 6.3   | 805   | 24.9  | 1,155 | 14.1  | 181   | 9.6   | 274   | 4.7   | 2,705  | 11.4  |
| 2003       | 2,043 | 44.7  | 1,060 | 32.8  | 356   | 4.4   | 75    | 4.0   | 30    | 0.5   | 3,564  | 15.0  |
| 2002       | 1,770 | 38.7  | 570   | 17.7  | 129   | 1.6   |       |       |       |       | 2,469  | 10.4  |
| 2001       | 408   | 8.9   | 53    | 1.6   | 41    | 0.5   |       |       |       |       | 502    | 2.1   |
| 2000       | 19    | 0.4   | 30    | 0.9   |       |       |       |       |       |       | 49     | 0.2   |
| 1999       |       |       | 13    | 0.4   |       |       |       |       |       |       | 13     | 0.1   |
| 1998       |       |       | 13    | 0.4   |       |       |       |       |       |       | 13     | 0.1   |
| 1997       | 39    | 0.9   |       |       |       |       |       |       |       |       | 39     | 0.2   |
| 1996       |       |       |       |       |       |       |       |       |       |       |        |       |
| 1995       |       |       | 13    | 0.4   |       |       |       |       |       |       | 13     | 0.1   |
| Totals     | 4,569 | 100.0 | 3,227 | 100.0 | 8,164 | 100.0 | 1,880 | 100.0 | 5,845 | 100.0 | 23,685 | 100.0 |

Note. Table may not add due to rounding.

Table 17. Year class composition and estimated number of striped bass harvested from the Atlantic Ocean commercial fisheries, NC, 2010/2011. Percent composition is by number.

| Year Class | Male  |        |        | Female |         |        | Totals |         |        |
|------------|-------|--------|--------|--------|---------|--------|--------|---------|--------|
|            | N     | LBS    | % Comp | N      | LBS     | % Comp | N      | LBS     | % Comp |
| 2005       | 476   | 4,866  | 4.4    | 571    | 7,158   | 5.3    | 1,046  | 12,024  | 9.78   |
| 2004       | 428   | 6,087  | 4.0    | 476    | 6,915   | 4.4    | 904    | 13,002  | 8.44   |
| 2003       | 666   | 12,325 | 6.2    | 2,283  | 43,461  | 21.3   | 2,949  | 55,787  | 27.56  |
| 2002       | 285   | 7,067  | 2.7    | 1,760  | 38,832  | 16.4   | 2,045  | 45,899  | 19.11  |
| 2001       | 190   | 4,351  | 1.8    | 1,902  | 52,798  | 17.8   | 2,093  | 57,150  | 19.56  |
| 2000       | 48    | 1,416  | 0.4    | 523    | 15,922  | 4.9    | 571    | 17,337  | 5.33   |
| 1999       |       |        | 0.0    | 476    | 16,457  | 4.4    | 476    | 16,457  | 4.44   |
| 1998       |       |        |        | 190    | 7,303   | 1.8    | 190    | 7,303   | 1.78   |
| 1997       |       |        |        | 143    | 5,631   | 1.3    | 143    | 5,631   | 1.33   |
| 1996       |       |        |        | 190    | 7,911   | 1.8    | 190    | 7,911   | 1.78   |
| 1995       |       |        |        | 48     | 1,782   | 0.4    | 48     | 1,782   | 0.44   |
| 1994       |       |        |        | 48     | 2,317   | 0.4    | 48     | 2,317   | 0.44   |
| Totals     | 2,093 | 36,112 | 19.6   | 8,608  | 206,488 | 80.4   | 10,701 | 242,600 | 100.00 |

Note. Table may not add due to rounding.

Table 18. Year class composition, total length (mm) and weight (kg) data for striped bass sampled from the 2010/2011 Atlantic Ocean commercial harvest Length and weight data are for aged fish only. Standard deviations are listed in parentheses.

| Year Class | N Aged | Total Length (mm) |       |       | Weight (kg) |      |      |
|------------|--------|-------------------|-------|-------|-------------|------|------|
|            |        | Mean              | Min   | Max   | Mean        | Min  | Max  |
| 2005       | 22     | 786 (35)          | 711   | 832   | 5.2 (1.5)   | 3.0  | 7.5  |
| 2004       | 19     | 825 (21)          | 790   | 867   | 6.5 (1.3)   | 3.8  | 8.3  |
| 2003       | 62     | 903 (29)          | 854   | 952   | 8.6 (1.2)   | 6.0  | 11.0 |
| 2002       | 43     | 963 (33)          | 896   | 1,078 | 10.2 (1.6)  | 7.2  | 15.3 |
| 2001       | 45     | 1,007 (37)        | 922   | 1,091 | 12.4 (1.6)  | 9.3  | 16.3 |
| 2000       | 12     | 1,043 (21)        | 1,010 | 1,068 | 13.8 (1.0)  | 12.0 | 15.0 |
| 1999       | 10     | 1,086 (12)        | 1,060 | 1,104 | 15.7 (1.5)  | 12.9 | 18.1 |
| 1998       | 4      | 1,116 (12)        | 1,101 | 1,129 | 17.4 (1.0)  | 16.0 | 18.3 |
| 1997       | 3      | 1,121 (12)        | 1,108 | 1,131 | 17.9 (2.8)  | 14.7 | 19.8 |
| 1996       | 4      | 1,152 (14)        | 1,132 | 1,166 | 18.9 (2.7)  | 15.3 | 21.7 |
| 1995       | 1      | 1,187             |       |       | 17.0        |      |      |
| 1994       | 1      | 1,229             |       |       | 22.1        |      |      |
| Totals     | 226    |                   |       |       |             |      |      |

Table 19. Estimated number of striped bass by year class harvested during the fall commercial harvest, Albemarle Sound Management Area, NC 2006 – 2010.

| Year Class | 2006  |       | 2007  |       | 2008  |       | 2009  |       | 2010  |       | Totals |       |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
|            | N     | %     | N     | %     | N     | %     | N     | %     | N     | %     | N      | %     |
| 2007       |       |       |       |       |       |       |       |       | 928   | 16.0  | 928    | 3.2   |
| 2006       |       |       |       |       |       |       | 1,264 | 15.6  | 1,699 | 29.2  | 2,963  | 10.4  |
| 2005       |       |       |       |       | 473   | 14.1  | 2,995 | 37.0  | 1,832 | 31.5  | 5,300  | 18.5  |
| 2004       |       |       | 170   | 3.4   | 1,003 | 29.9  | 2,293 | 28.3  | 947   | 16.3  | 4,413  | 15.4  |
| 2003       | 182   | 2.9   | 991   | 19.6  | 701   | 20.9  | 655   | 8.1   | 290   | 5.0   | 2,819  | 9.9   |
| 2002       | 2,484 | 39.5  | 1,962 | 38.9  | 473   | 14.1  | 281   | 3.5   | 78    | 1.3   | 5,278  | 18.5  |
| 2001       | 2,171 | 34.5  | 1,191 | 23.6  | 189   | 5.6   | 140   | 1.7   | 34    | 0.6   | 3,725  | 13.0  |
| 2000       | 545   | 8.7   | 448   | 8.9   | 208   | 6.2   | 140   | 1.7   | 6     | 0.1   | 1,347  | 4.7   |
| 1999       | 154   | 2.5   | 113   | 2.2   | 76    | 2.3   | 94    | 1.2   |       |       | 437    | 1.5   |
| 1998       | 154   | 2.5   | 56    | 1.1   | 38    | 1.1   | 94    | 1.2   |       |       | 342    | 1.2   |
| 1997       | 66    | 1.1   | 57    | 1.1   | 57    | 1.7   | 47    | 0.6   |       |       | 227    | 0.8   |
| 1996       | 110   | 1.8   | 28    | 0.6   | 38    | 1.1   | 47    | 0.6   |       |       | 223    | 0.8   |
| 1995       | 198   | 3.2   | 28    | 0.6   | 38    | 1.1   | 47    | 0.6   |       |       | 311    | 1.1   |
| 1994       | 110   | 1.8   |       |       | 38    | 1.1   |       |       |       |       | 148    | 0.5   |
| 1993       | 88    | 1.4   |       |       |       |       |       |       |       |       | 88     | 0.3   |
| 1992       | 22    | 0.4   |       |       | 19    | 0.6   |       |       |       |       | 41     | 0.1   |
| Totals     | 6,284 | 100.0 | 5,044 | 100.0 | 3,351 | 100.0 | 8,097 | 100.0 | 5,816 | 100.0 | 28,592 | 100.0 |

Note. Table may not add due to rounding.

Table 20. Estimated number of striped bass by year class and sex harvested during the spring commercial harvest, Albemarle Sound Management Area, NC 2007 – 2011.

| Year Class | 2007   |       | 2008   |       | 2009   |       | 2010   |       | 2011   |       | Totals  |       |
|------------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|---------|-------|
|            | N      | %     | N      | %     | N      | %     | N      | %     | N      | %     | N       | %     |
| 2008       |        |       |        |       |        |       |        |       |        |       |         |       |
| 2007       |        |       |        |       |        |       | 3,490  | 8.7   | 8,395  | 39.3  | 11,885  | 10.5  |
| 2006       |        |       |        |       |        |       | 18,350 | 45.7  | 7,255  | 34.0  | 25,605  | 22.7  |
| 2005       |        |       |        |       | 8,502  | 53.5  | 14,691 | 36.6  | 2,695  | 12.6  | 25,888  | 23.0  |
| 2004       |        |       | 4,928  | 38.4  | 4,420  | 27.8  | 2,139  | 5.3   | 1,451  | 6.8   | 12,938  | 11.5  |
| 2003       | 2,972  | 13.2  | 5,676  | 44.3  | 2,010  | 12.6  | 619    | 1.5   | 829    | 3.9   | 12,106  | 10.7  |
| 2002       | 11,236 | 49.9  | 1,722  | 13.4  | 625    | 3.9   | 225    | 0.6   | 311    | 1.5   | 14,119  | 12.5  |
| 2001       | 4,241  | 18.8  | 236    | 1.8   | 214    | 1.3   | 225    | 0.6   | 311    | 1.5   | 5,227   | 4.6   |
| 2000       | 797    | 3.5   | 84     | 0.7   | 38     | 0.2   | 56     | 0.1   | 104    | 0.5   | 1,079   | 1.0   |
| 1999       | 471    | 2.1   | 69     | 0.5   | 43     | 0.3   | 56     | 0.1   |        |       | 639     | 0.6   |
| 1998       | 507    | 2.3   | 40     | 0.3   | 36     | 0.2   | 56     | 0.1   |        |       | 639     | 0.6   |
| 1997       | 507    | 2.3   | 57     | 0.4   | 13     | 0.1   | 113    | 0.3   |        |       | 690     | 0.6   |
| 1996       | 834    | 3.7   | 13     | 0.1   | 3      | 0.0   | 56     | 0.1   |        |       | 906     | 0.8   |
| 1995       | 616    | 2.7   |        |       |        |       |        |       |        |       | 616     | 0.5   |
| 1994       | 217    | 1.0   |        |       |        |       |        |       |        |       | 217     | 0.2   |
| 1993       | 109    | 0.5   |        |       |        |       | 56     | 0.1   |        |       | 165     | 0.1   |
| Totals     | 22,507 | 100.0 | 12,825 | 100.0 | 15,904 | 100.0 | 40,132 | 100.0 | 21,350 | 100.0 | 112,718 | 100.0 |

Note. Table may not add due to rounding.

Table 21. Year class composition and estimated number of striped bass harvested from the Atlantic Ocean commercial fisheries, NC, 2006/2007 – 2010/2011.

| Year Class | 2006/2007 |       | 2007/2008 |       | 2008/2009 |       | 2009/2010 |       | 2010/2011 |       | Totals |       |
|------------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|--------|-------|
|            | N         | %     | N         | %     | N         | %     | N         | %     | N         | %     | N      | %     |
| 2005       |           |       |           |       |           |       |           |       | 1,046     | 9.8   | 1,046  | 1.6   |
| 2004       |           |       |           |       |           |       | 423       | 3.5   | 904       | 8.4   | 1,327  | 2.1   |
| 2003       |           |       |           |       |           |       | 502       | 4.2   | 2,949     | 27.6  | 3,451  | 5.4   |
| 2002       |           |       |           |       | 109       | 1.2   | 1,745     | 14.4  | 2,045     | 19.1  | 3,899  | 6.1   |
| 2001       | 217       | 1.2   | 833       | 6.3   | 1,115     | 12.4  | 2,379     | 19.7  | 2,093     | 19.6  | 6,637  | 10.5  |
| 2000       | 391       | 2.1   | 1,011     | 7.6   | 833       | 9.3   | 2,300     | 19.0  | 571       | 5.3   | 5,106  | 8.0   |
| 1999       | 1,325     | 7.2   | 714       | 5.4   | 1,067     | 11.9  | 2,459     | 20.4  | 476       | 4.4   | 6,041  | 9.5   |
| 1998       | 3,258     | 17.7  | 2,676     | 20.2  | 2,841     | 31.6  | 1,454     | 12.0  | 190       | 1.8   | 10,419 | 16.4  |
| 1997       | 4,496     | 24.4  | 2,438     | 18.4  | 1,788     | 19.9  | 608       | 5.0   | 143       | 1.3   | 9,473  | 14.9  |
| 1996       | 3,757     | 20.4  | 1,427     | 10.8  | 705       | 7.8   | 185       | 1.5   | 190       | 1.8   | 6,264  | 9.9   |
| 1995       | 2,997     | 16.3  | 1,546     | 11.7  | 313       | 3.5   |           |       | 48        | 0.4   | 4,904  | 7.7   |
| 1994       | 1,303     | 7.1   | 892       | 6.7   | 80        | 0.9   |           |       | 48        | 0.4   | 2,323  | 3.7   |
| 1993       | 434       | 2.4   | 535       | 4.0   | 101       | 1.1   |           |       |           |       | 1,070  | 1.7   |
| 1992       | 174       | 0.9   | 535       | 4.0   | 43        | 0.5   | 26        | 0.2   |           |       | 778    | 1.2   |
| 1991       | 43        | 0.2   | 654       | 4.9   |           |       |           |       |           |       | 697    | 1.1   |
| Totals     | 18,395    | 100.0 | 13,261    | 100.0 | 8,995     | 100.0 | 12,081    | 100.0 | 10,701    | 100.0 | 63,433 | 100.0 |

Table 22. Striped bass NC coastal rivers stocking summary, 2006 – 2010.

| Year | Stocking location   | Stocking numbers* | Stocking size | Broodstock source |
|------|---------------------|-------------------|---------------|-------------------|
| 2006 | Neuse               | 146,340           | Phase I       | Roanoke           |
|      | Northeast Cape Fear | 84,125            | Phase I       | Roanoke           |
|      | Cape Fear           | 80,450            | Phase I       | Roanoke           |
|      | Neuse               | 99,595            | Phase II      | Roanoke           |
|      | Cape Fear           | 102,283           | Phase II      | Roanoke           |
| 2007 | Tar/Pamlico         | 160,995           | Phase I       | Roanoke           |
|      | Neuse               | 172,882           | Phase I       | Roanoke           |
|      | Northeast Cape Fear | 79,690            | Phase I       | Roanoke           |
|      | Cape Fear           | 80,376            | Phase I       | Roanoke           |
|      | Tar/Pamlico         | 69,871            | Phase II      | Roanoke           |
|      | Neuse               | 69,953            | Phase II      | Roanoke           |
| 2008 | Tar/Pamlico         | 331,202           | Phase I       | Roanoke           |
|      | Neuse               | 313,798           | Phase I       | Roanoke           |
|      | Northeast Cape Fear | 190,460           | Phase I       | Roanoke           |
|      | Cape Fear           | 193,450           | Phase I       | Roanoke           |
|      | Tar/Pamlico         | 91,692            | Phase II      | Roanoke           |
|      | Cape Fear           | 92,580            | Phase II      | Roanoke           |
| 2009 | Tar/Pamlico         | 99,730            | Phase I       | Roanoke           |
|      | Neuse               | 100,228           | Phase I       | Roanoke           |
|      | Northeast Cape Fear | 51,750            | Phase I       | Roanoke           |
|      | Cape Fear           | 166,812           | Phase I       | Roanoke           |
|      | Tar/Pamlico^        | 61,054            | Phase II      | Roanoke           |
|      | Neuse               | 104,061           | Phase II      | Roanoke           |
|      | Cape Fear           | 112,674           | Phase II      | Roanoke           |
| 2010 | Tar/Pamlico         | 114,012           | Phase II      | Roanoke           |
|      | Neuse               | 107,142           | Phase II      | Roanoke           |
|      | Cape Fear           | 198,927           | Phase II      | Cape Fear         |

\* Numbers are approximate

^ 61,054 additional Phase II fish were stocked in the Tar/Pamlico due to excessive production



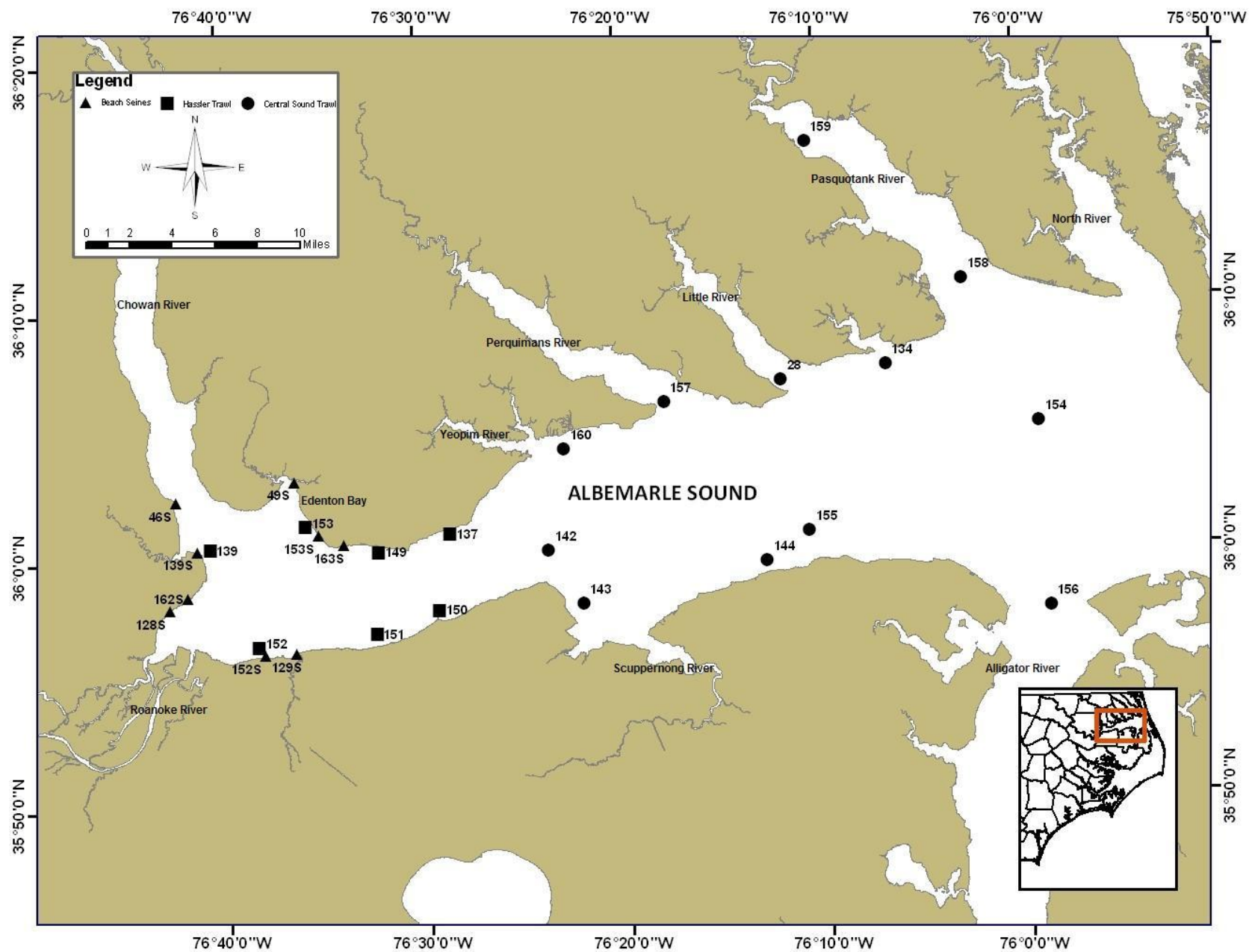


Figure 1. Location of juvenile A/R striped bass beach seine and trawl sites, Albemarle Sound NC, 2010.

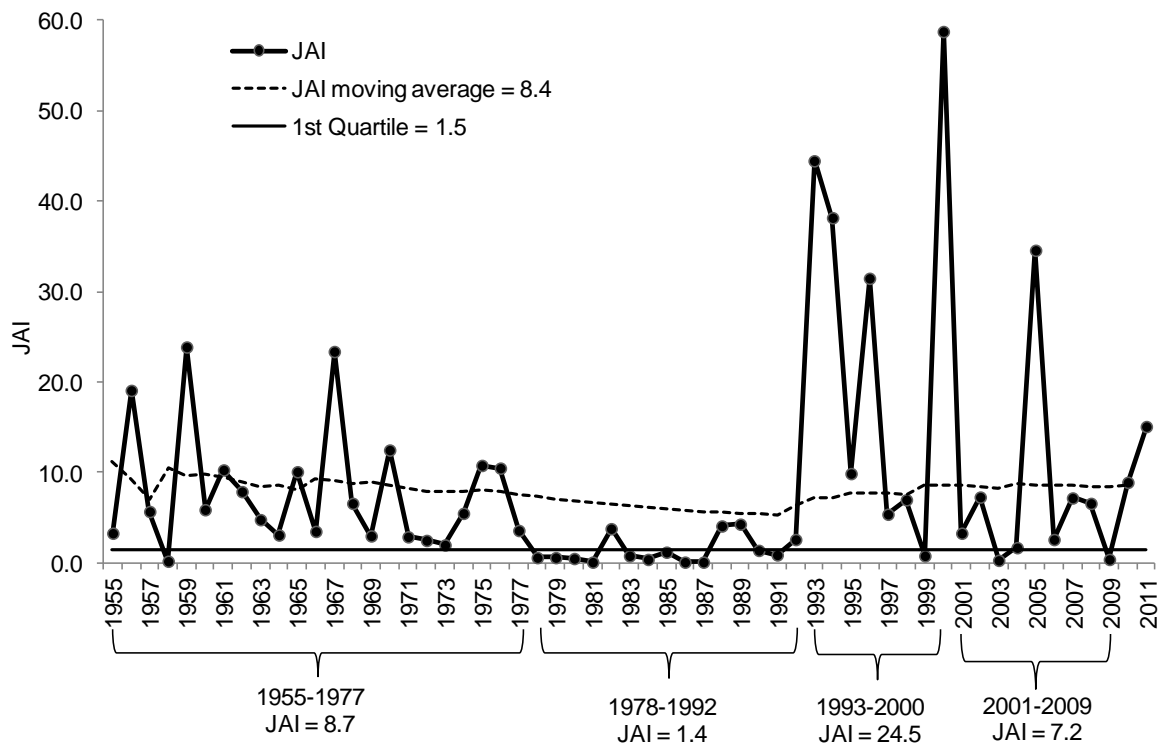


Figure 2. Juvenile Abundance Index for A/R striped bass young-of-year trawl sampling in western Albemarle Sound NC 1955-2011, with periods of high, normal, and low recruitment identified. Values below the 1<sup>st</sup> Quartile are considered spawning failures.

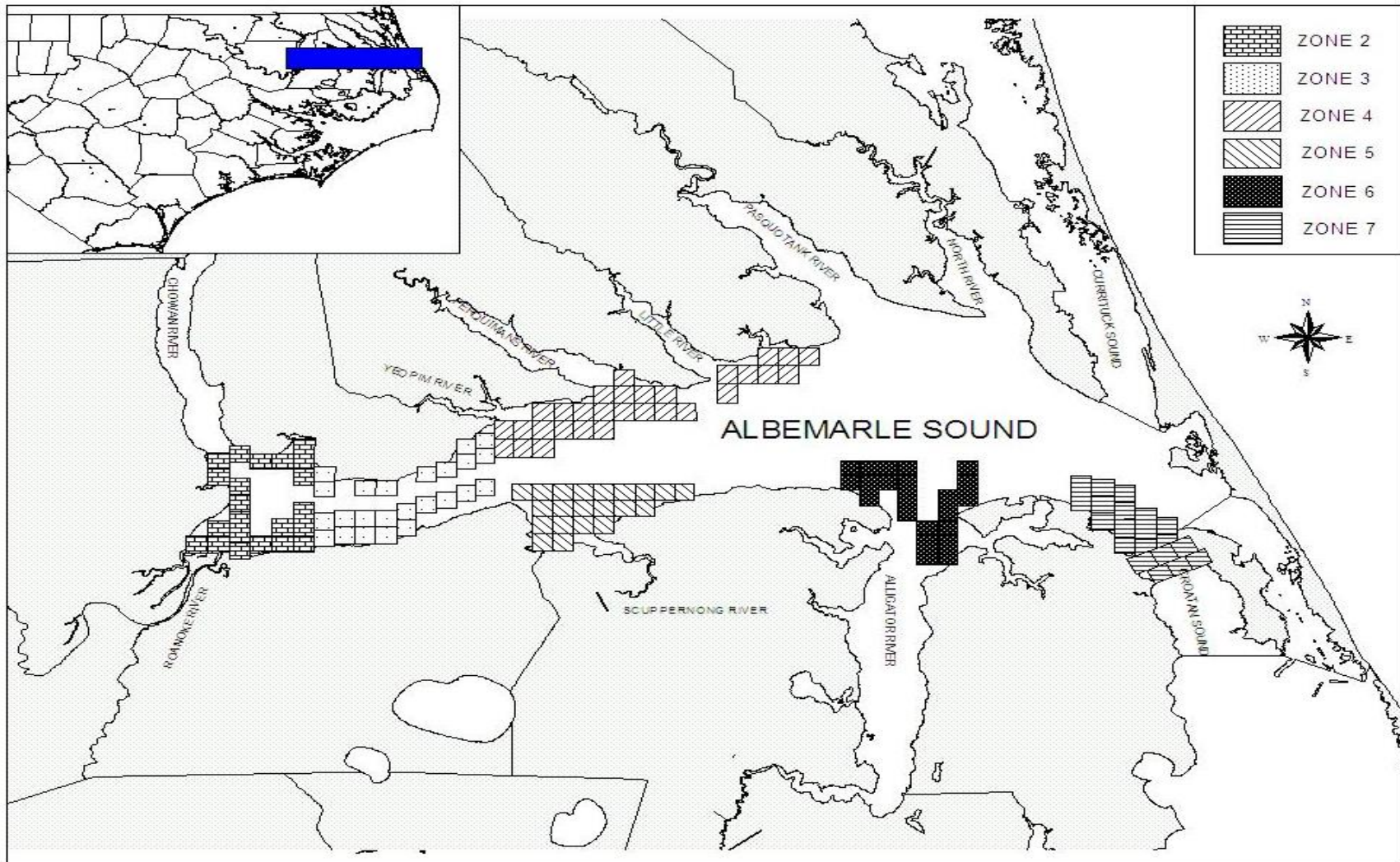


Figure 3. Sample zones for the NCDMF striped bass fall/winter Independent Gill Net Survey, Albemarle and Croatan sounds, NC, 2010/2011.



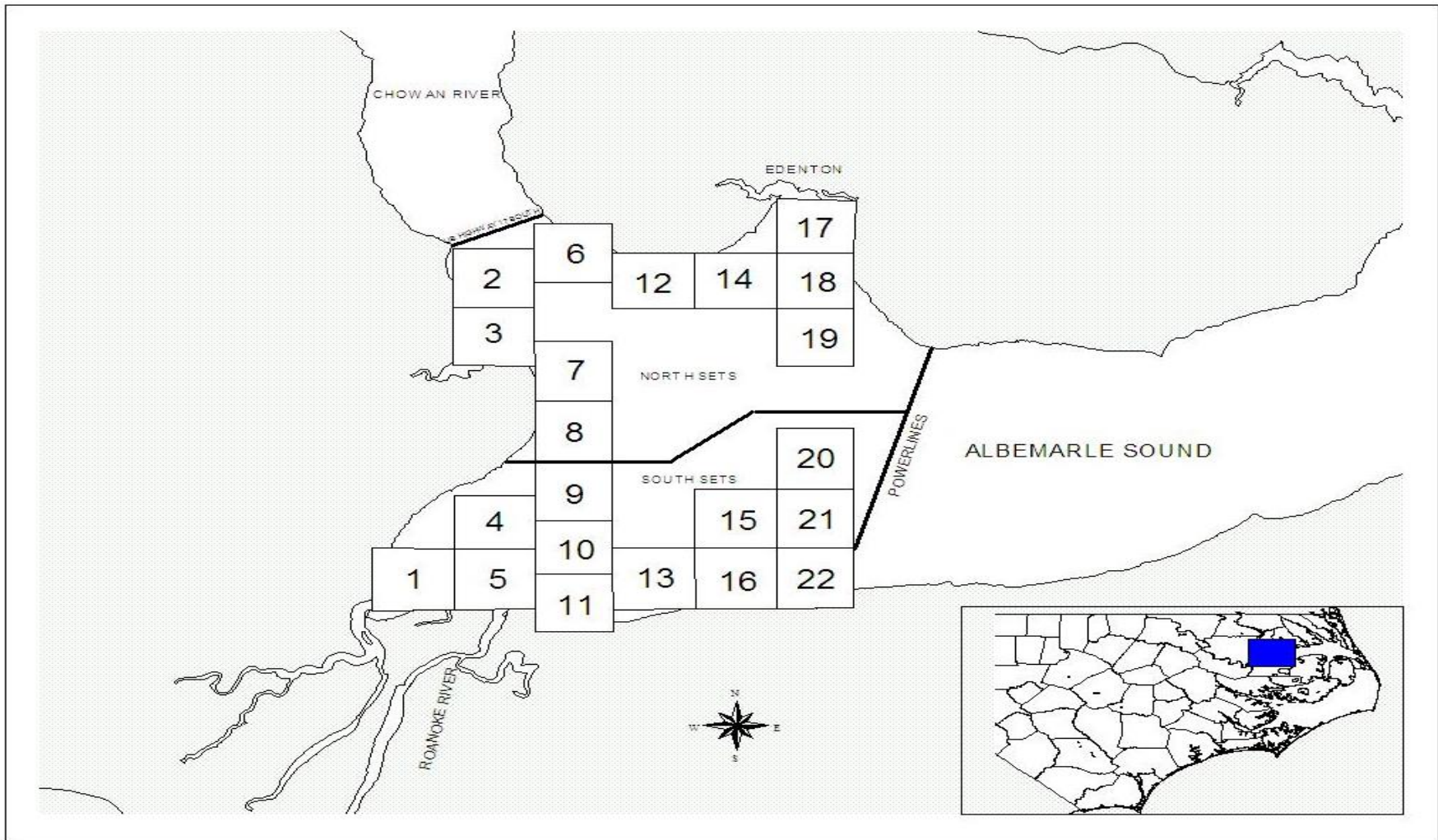


Figure 4. Sample Zone II and the north/south quadrants for the NCDMF A/R striped bass spawning stock spring Independent Gill Net Survey, Albemarle Sound, NC, 2011.

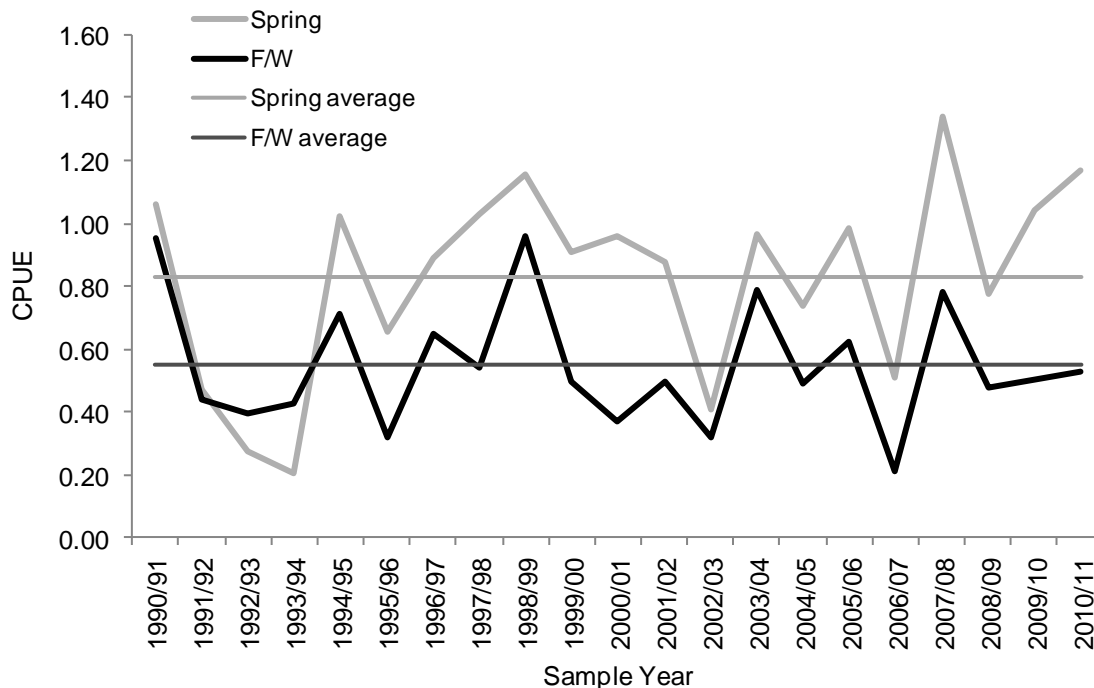


Figure 5. Fall/Winter and Spring independent Gill Net Survey Catch Per Unit Effort and long-term averages.

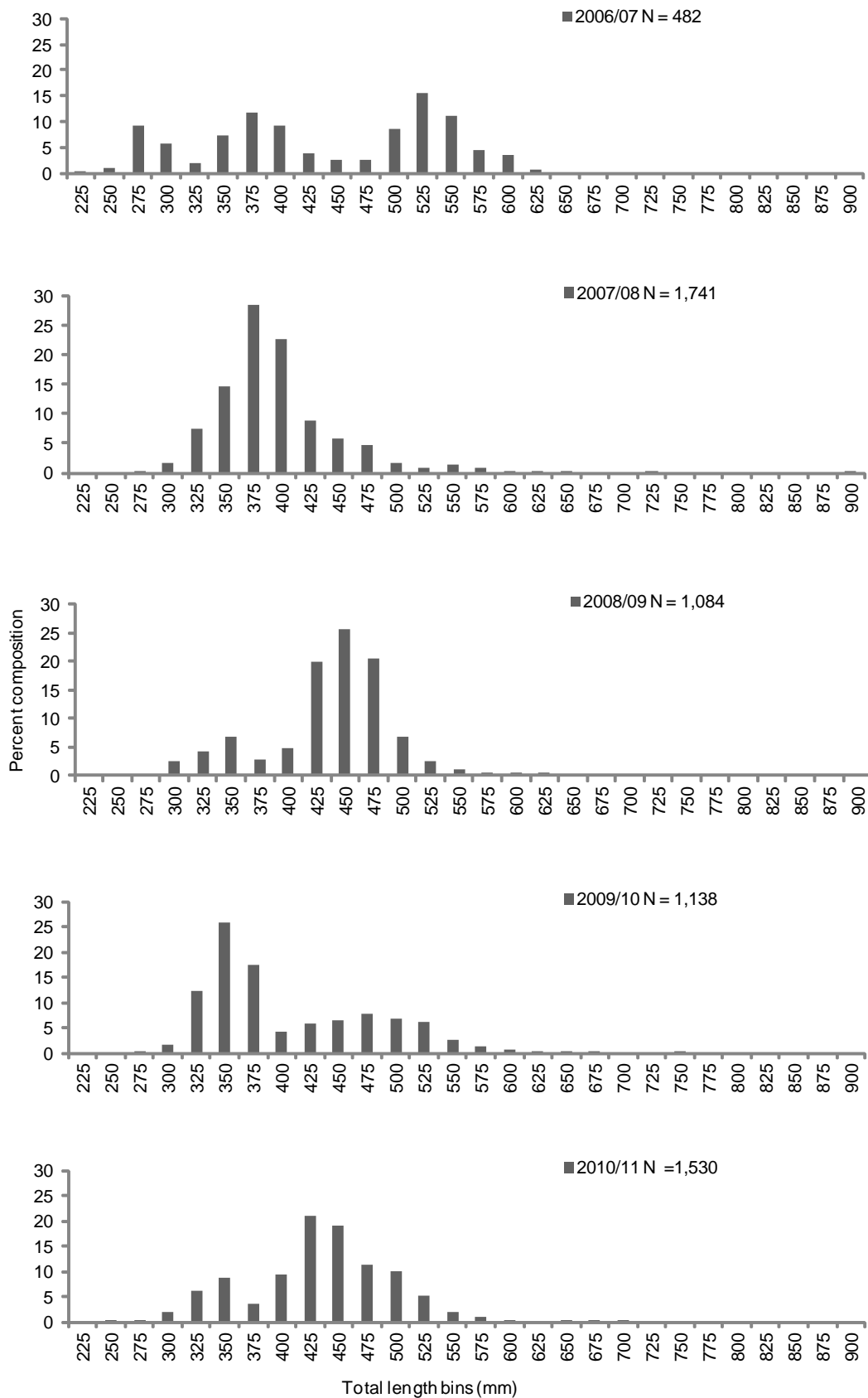


Figure 6. Length frequencies of striped bass collected in the fall/winter Independent Gill Net Survey, Albemarle Sound, NC, 2006/2007 – 2010/2011.

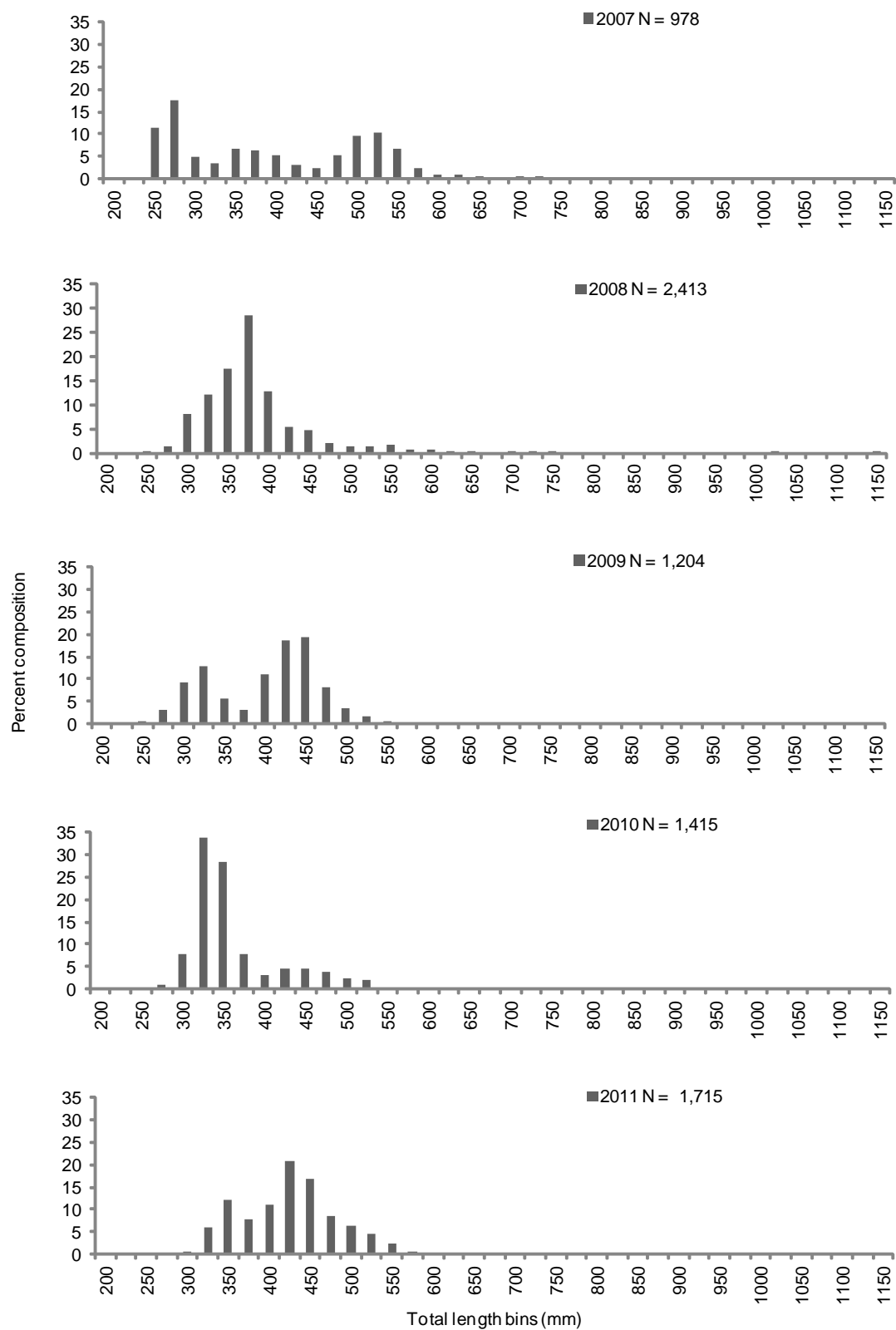


Figure 7. Length frequencies of striped bass collected in the spring Independent Gill Net Survey, Albemarle Sound, NC, 2007 – 2011.

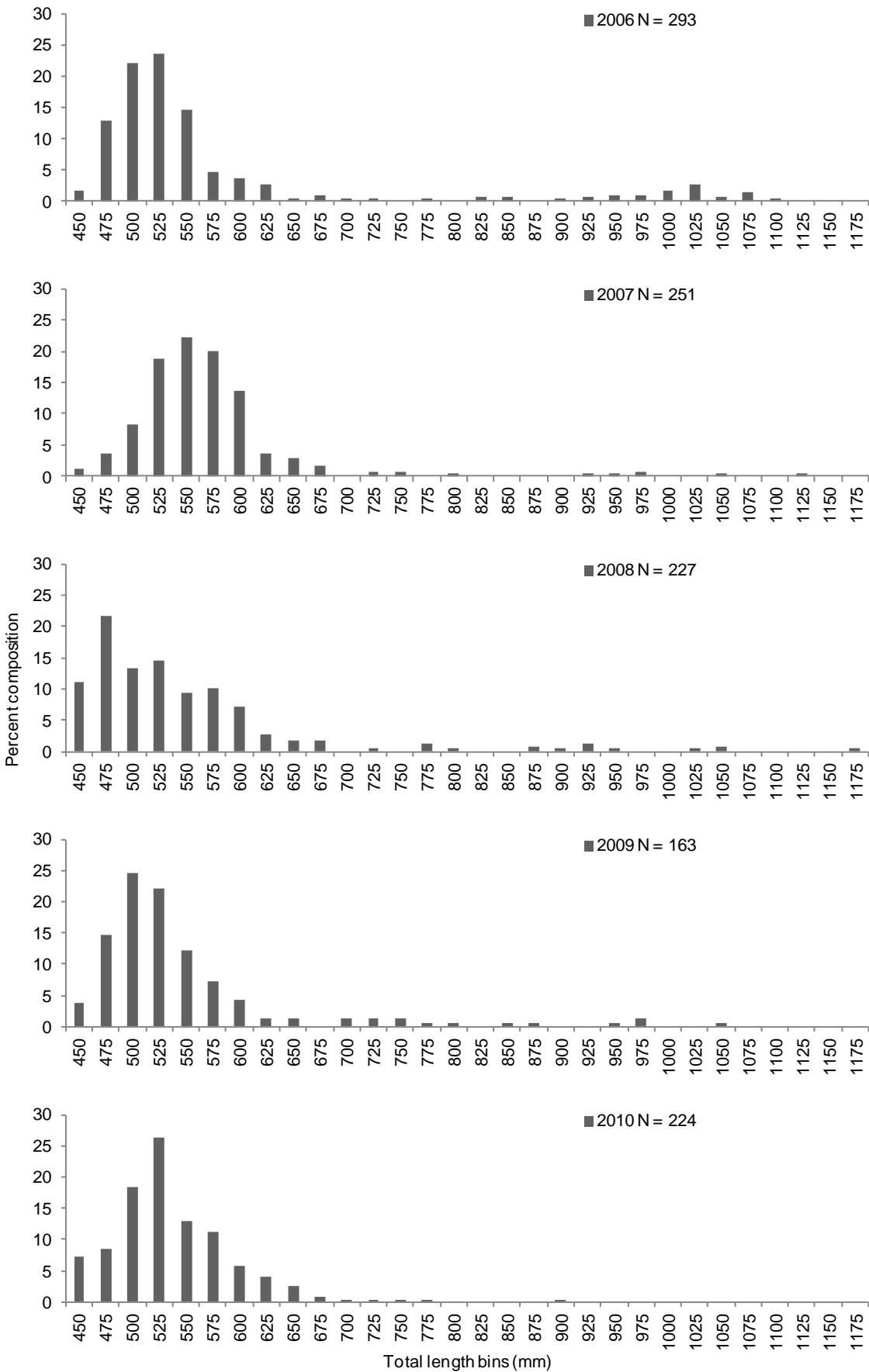


Figure 8. Length frequencies of striped bass collected from the Albemarle Sound Management Area fall commercial harvest 2006 – 2010.



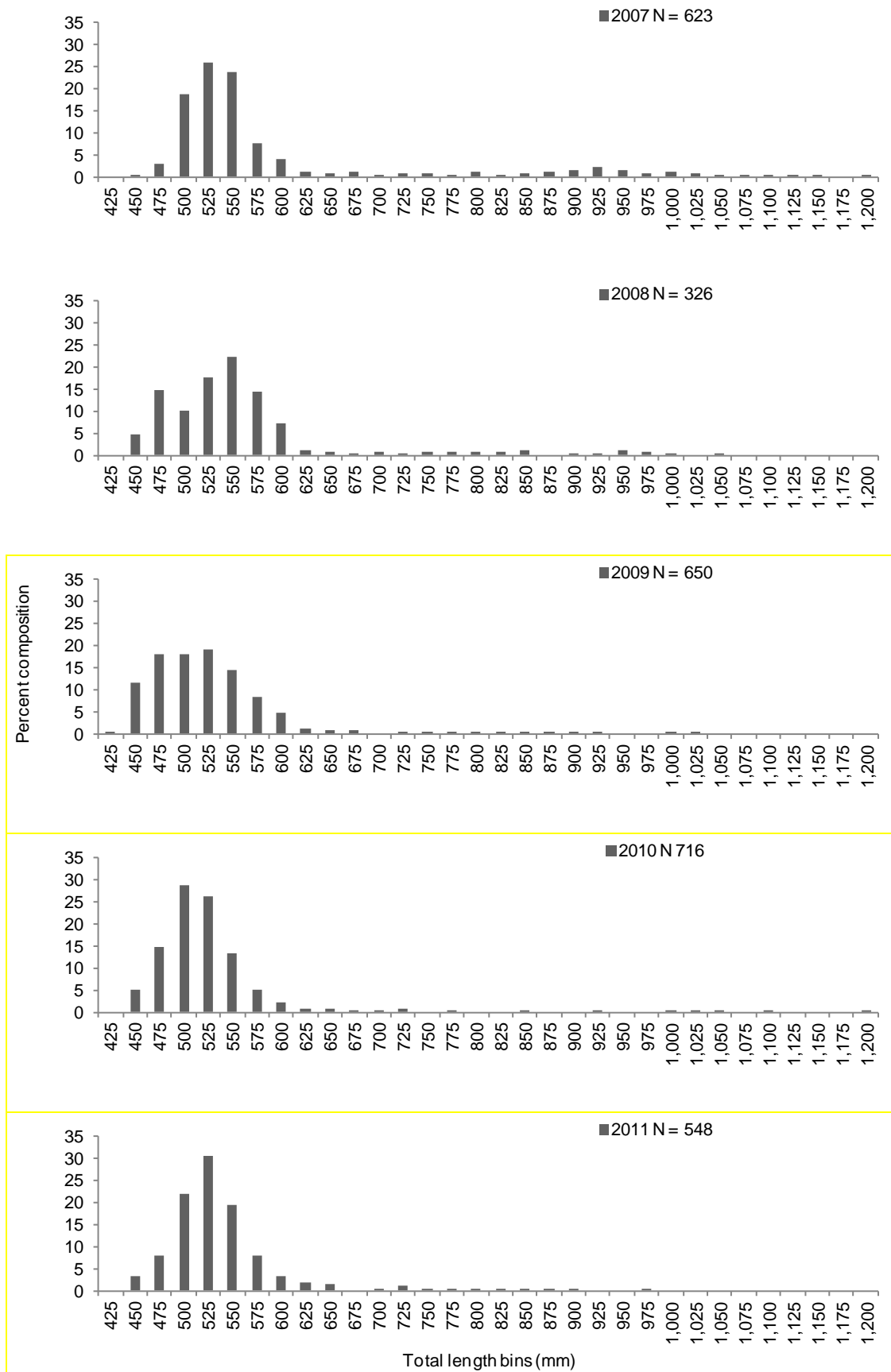


Figure 9. Length frequencies of striped bass collected from the Albemarle Sound Management Area striped bass spring commercial harvest 2007 – 2011.

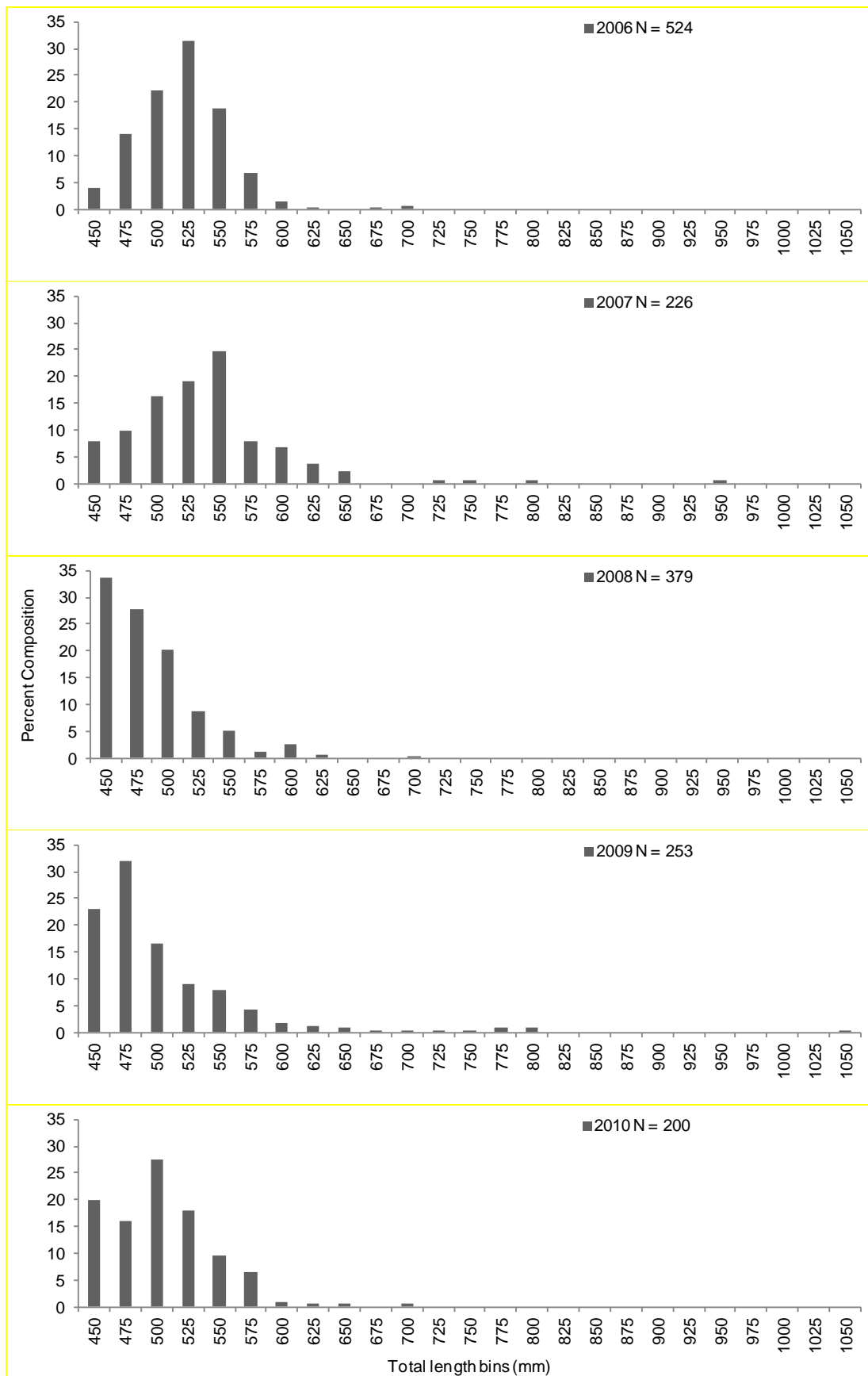


Figure 10. Length frequencies of striped bass collected from the Albemarle Sound Management Area striped bass fall recreational harvest 2006 – 2010.

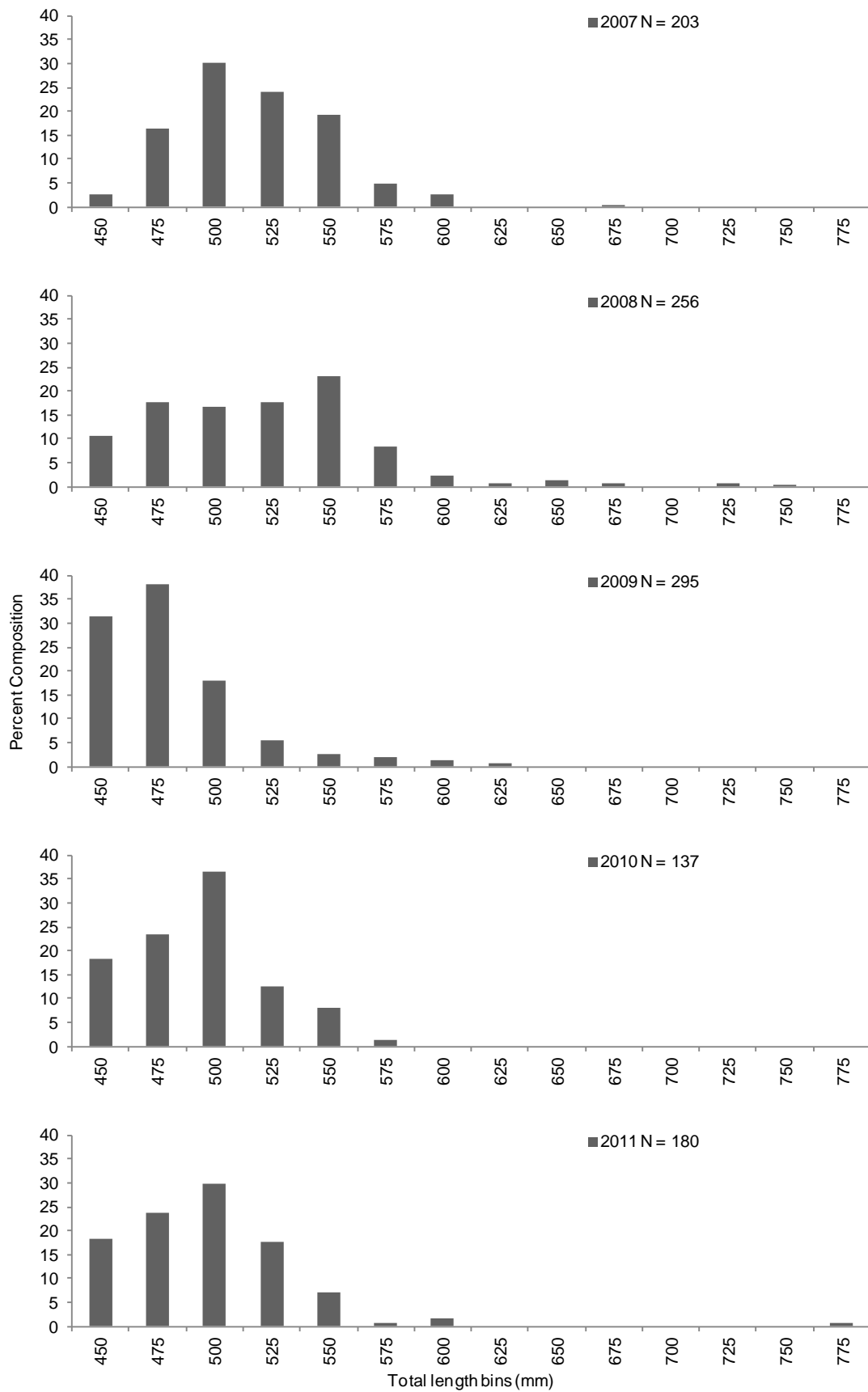


Figure 11. Length frequencies of striped bass collected from the Albemarle Sound Management Area spring recreational harvest 2007 – 2011.

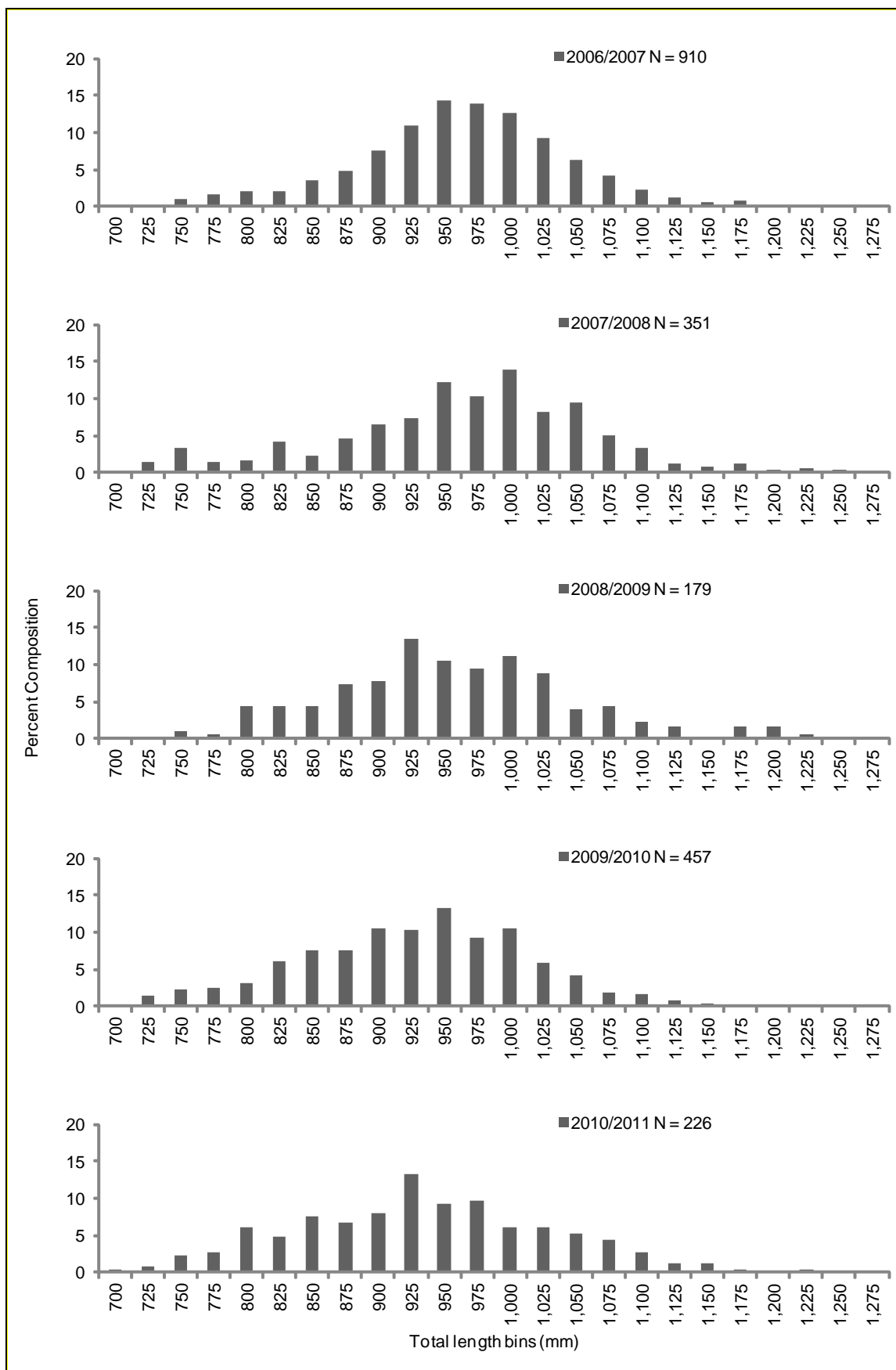


Figure 12. Length frequencies of striped bass collected from the Atlantic Ocean commercial harvest December 2006-November 2011.

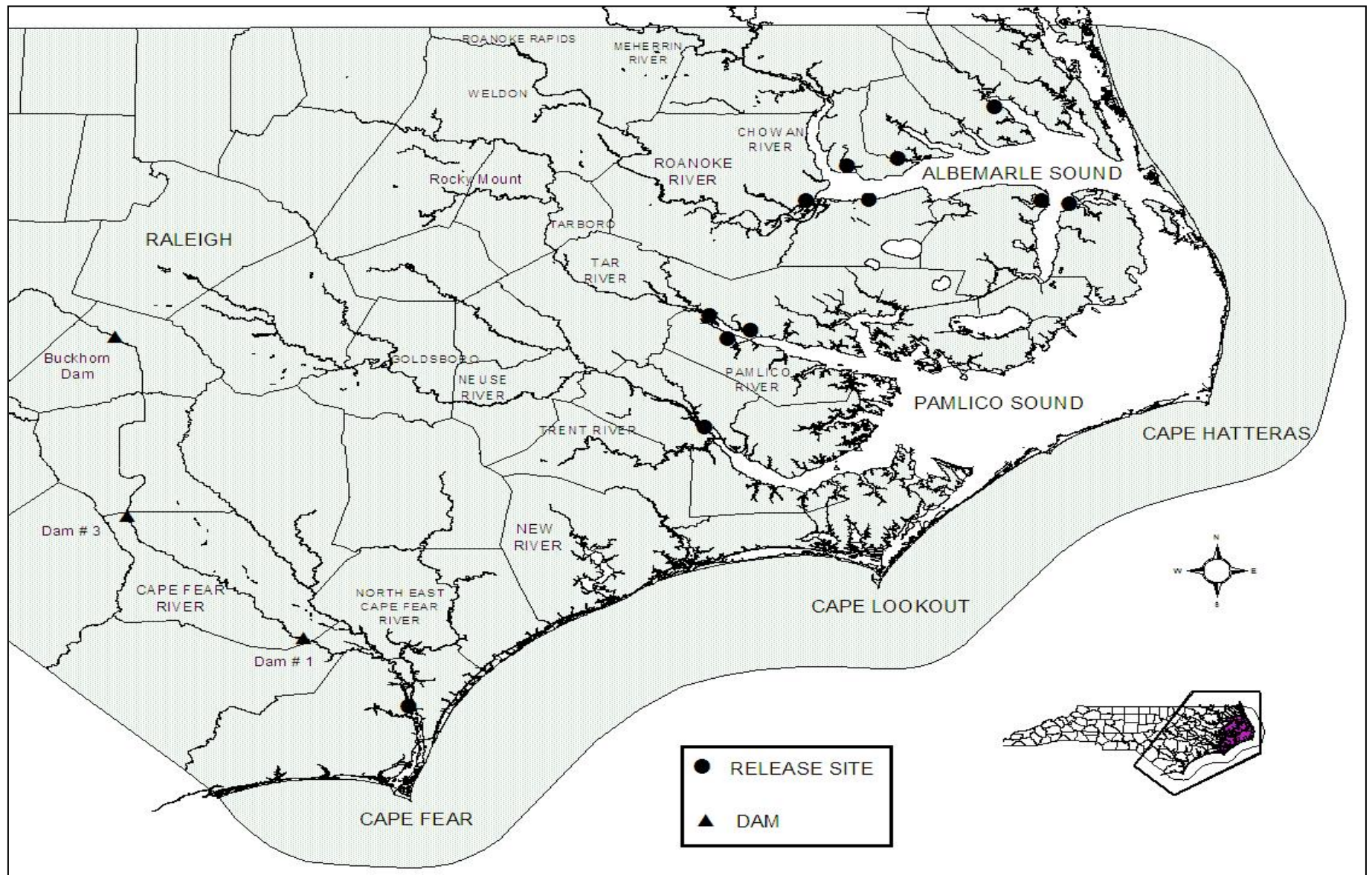


Figure 13. Release sites of Phase II striped bass stockings, NC, 1980-2011.